

A Study on the Opinions of Class Teachers Regarding Their Proficiencies in Using Thinking Skills

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Abstract

Thinking is a highly complex process. Thinking skills include important skills such as problem solving, decision making, critical thinking and creative thinking. The necessity for individuals to be equipped with these skills in order to cope with problems in life and to arrange their lives according to their needs has become the subject of studies in the field of education in recent years. Educational systems seek to find ways to equip individuals with these skills. However, in the Turkish Education System, students are mostly engaged in a teaching activity to transfer the information taught without thinking on it, from primary school to university. Observations suggest that students make learning in this way become a habit and avoid situations that require them to think on their own. In this sense, the problem continues to grow and establish roots until university. In university, it is important that teacher candidates demonstrate the expected performance in their thinking activities, because a teacher who has the responsibility to develop thinking skills must have already developed his / her own thinking skills. The main question here is: How do teacher candidates assess their proficiency levels in thinking skills? Do teacher candidates' thinking skill proficiencies differ according to different variables? The purpose of this research, which is planned to find the answers to these questions, is to examine the opinions of class teachers regarding their proficiencies in thinking skills according to different variables. In this study, screening model was used and "Personal Information Form" along with "Questionnaire for Class Teacher Candidates' Opinions Regarding Their Proficiencies In Using Thinking Skills" were used as data collection tools. The sample of the study was composed of 280 teacher candidates, chosen with convenience sampling in a Basic Education Department of a state university in Istanbul. Results obtained from the data analyzed by performing the necessary statistical procedures were as follows: Thinking skill proficiencies of teacher candidates were slightly above the average. While these proficiencies do not differ according to gender and parental education status, they do differ according to the variables of age, class and book reading frequency.

Keywords: Thinking, thinking skills, class teacher candidate

1. Introduction

Thinking is a mental process based on making meaningful connections between concepts or events and making conclusions from them. It is an ability that helps individuals to live in a qualified and conscious way, to solve the problems they face, and to develop themselves individually and socially. The human brain is actively used in the thinking process. Thinking is also precise, consistent, coherent conscious experiences that regulate and shape logic and have creative aspects (Tok, 2008). Thinking is highly complex with these features. It is also recognized that it is teachable, although it is the most basic ability needed in every aspect of life. Thinking is considered as a skill and there are many important skills in thinking skills such as problem solving, decision making, critical thinking and creative thinking.

Thinking skills are the ability to use knowledge to discover the system of the world and solve problems (Çubukçu, 2011). The primary aim of the training is to equip individuals with the characteristics with which they can meet the conditions of today and can sustain their lives efficiently. Individuals who will be raised with these characteristics should have the characteristics of those who are researching, questioning, learning to learn, creative, flexible, benefiting from technology, able to contribute in team work and problem solving. In this case, one of the most important functions of education is to teach thinking. As a matter of fact, today, many education systems are not limited to information exchange and are based on teaching thinking and thinking skills. The main purpose of educational systems that aim to raise individuals who put what they learn into practice and shape the society is the education these skills.

The necessity of individuals to be equipped with skills has become the subject of studies in the field of education in recent years. In every aspect of life, there is thinking at every stage of education and adaptation to changing living conditions is possible with the systematization of thinking. In this age, this is the most important function expected from schools. It is also expected that individuals are respectful and tolerant to people and the world. Teaching thinking skills makes the person realize the importance of what they learn and how they could learn it. In addition, he/she learns about his/her own learning process and turns the knowledge into skills. Therefore, thinking skills, which are the basis of a person's process of discovering learning, should be taught from a young age.

Education systems have been searching for ways to equip individuals with these skills for some time. With

the results of many researches in recent years and the knowledge that skills are teachable, these skills have been included in all the programs that have been refined. Despite the fact that the Turkish Education System has included these skills in the programs since 2005, the education and training activities that have been carried out and thinking skills being neglected in these activities push students towards memorizing information without understanding or questioning. One of the most important elements in making educational programs functional is the teacher. An education system can only be as effective as the teacher implementing it. The effort of the teachers in the teaching of thinking skills starting from young ages is too important to underestimate. Both the professional knowledge and efforts of teachers are weak in terms of supporting these skills. Moreover, Kuran (2002) stated that teachers who are the practitioners of the program should have sufficient equipment and a rich knowledge of activities to raise individuals with thinking skills, and should be people who can adapt to the change in society and develop themselves, are open to learning, democratic and problem solving. In schools, students should be taught how to cope with life, and with the information learned, individuals should be able to solve problems and make the right decisions. In other words, thinking skills should be able to turn into practice that will make life better qualified. The process of thinking that requires all these operations should be a planned part of education. And teachers are the ones who can plan it and adapt it to education. Teachers should be equipped with these skills in pre-service trainings and should have the proficiency to provide them to their students.

However, it can be said that in the Turkish Education System, students continue their education from elementary school to university with knowledge-based studies. Observations show that students have turned learning this way into a habit and they have avoided situations requiring them to think themselves for years. In this sense, the problem continues all the way to university by growing and establishing roots. As a matter of fact, the problem continues in the education of teacher candidates. A teacher who is not proficient in thinking skills may have difficulty in developing his/her students' thinking skills. Therefore, in the development of society, it is very important how children are raised as well as how their teachers, those who educate and guide these children are raised.

When the literature is examined, it has been seen that a single skill is dealt with in the studies about thinking skills. The results obtained from teachers and teacher candidates in these studies are not at the expected level. For example, there are some studies that show that teachers are insufficient in critical thinking skills (Halpern, 1988; Gelen, 2002; Seferoğlu and Akbıyık, 2006; Kürüm, 2007; Korkmaz, 2009a) and similarly that teachers have a moderate level of critical thinking (Tümekaya, Aybek and Aldağ, 2009). Similarly, it was found that teacher candidates did not have high levels of critical thinking either (Dutoğlu and Tuncel, 2008). Gelen's (2002) study, however, draws attention with its results as well as with not limiting thinking skills to one skill. In the survey results of this study, although the teachers found themselves to be "sufficient" in their thinking skills, the researcher's observations found them to be "insufficient" on average. That is, the results of the survey and observation did not back each other up.

Moreover, it is noteworthy that the measures related to the thinking skills developed-such as "Problem Solving Inventory (PSI)" developed by Heppner & Petersen (1982) and "The Melbourne Decision Making Questionnaire" developed by Mann, Burnett, Radford & Ford (1997)- were directed towards one thinking skill. Therefore, based on the knowledge that the studies and the developed measurement tools address a single thinking skill, this study was planned by taking into account a measurement tool/questionnaire that includes four basic thinking skills and the need for teacher candidates to determine the proficiency of themselves in these skills. The main question here is: How do teacher candidates assess their proficiency levels in thinking skills? Do teacher candidates' thinking skill proficiencies differ according to different variables? It is thought that the study, for the purpose of finding answers to these questions, will be important in terms of shedding light on the actions of the Ministry of National Education and Higher Education Institutions.

Purpose

The aim of this study is to examine the opinions of the prospective teachers about their thinking skills competencies according to various variables. In response to this main objective, answers to the following questions were sought:

- What are the proficiency levels of teacher candidates' thinking skills?
- Do teacher candidates' thinking skill proficiencies differ according to gender, age, grade level, book reading frequency and parents' education level?

2. Method

Research Model

In this study, the descriptive research method, screening model was used. Screening studies are the researches on the opinions of participants regarding a subject or an event, or their interests, skills, abilities, attitudes, etc., generally carried out on relatively larger samples than other studies (Büyüköztürk, Kılıç-Çakmak, Akgün,

Karadeniz and Demirel, 2017). In this study, we tried to reach as large a sampling as possible, and examined the opinions of class teacher candidates regarding their thinking skills proficiency levels and the state of these levels according to various variables.

Population Sampling

The population of this study consists of a total of 416 teacher candidates in the Basic Education Department in Istanbul in 2017-2018 academic year, since it was a public university giving researchers easy access, and the sample consisted of 280 teacher candidates. In the convenient sampling method (also called convenience/accidental/incidental sampling), the main aim is to prevent a loss of time, money and workforce. Here, the researcher works on the most accessible and maximum saving case samples (Cohen & Mannion, 1989; Ravid, 1994; Büyüköztürk et al., 2017). The demographics of teacher candidates who participated in the research are given in Table 1.

Table 1.
Demographics of prospective teachers who participated in the research

Gender	f	%
Female	205	73.22
Male	75	26.78
Age	d	%
Younger than 20	89	31.78
21 and older	191	68.22
Frequency of reading books	d	%
Frequently (at least once a week)	61	21.79
Sometimes (once or more a month)	140	50
Rarely (once or less a month)	79	28.21
Mother's educational level	d	%
Illiterate	18	6.43
Primary school	140	50
Secondary school	40	14.29
High school	63	22.5
University	19	6.79
Father's educational level	d	%
Illiterate	7	2.5
Primary school	99	35.36
Secondary school	46	16.43
High school	78	27.86
University	50	17.86
p	d	%
1st Year	87	31.07
2nd Year	64	22.86
3rd Year	78	27.86
4th Year	51	18.21
TOTAL	280	100

When Table 1 is examined, it is seen that 73.22% of the teacher candidates were females and 26.78% were males. 31.78% of teacher candidates were younger than 20 years, 68.22% were 21 years and older; and for frequency of reading books, 21.79% were frequently, 50% were sometimes and 28.21% were rarely. As for the teacher candidates' mothers' educational levels, 6.43% were illiterate, 50% were primary school, 14.29% secondary school, 22.5% high school and 6.79% were university. As for their fathers' educational levels, 2.5% were illiterate, 35.36% were primary school, 16.43% secondary school, 27.86% high school and 17.86% were university. 31.07% of the teacher candidates were in their first year, 22.86% second year, 27.86% third year and 18.21% were in fourth year.

Data Collection Tools

The data were collected by using the "Personal Information Form" prepared by the researchers to determine the gender, age, grade level, book reading frequency and parents' education levels of the teacher candidates. In addition, a questionnaire was prepared to determine the opinions of teacher candidates regarding their thinking skills proficiencies. In the process of creating the questionnaire, the related written sources have been examined and a pool of material consisting of 78 items regarding the study area has been formed. The number of items in the questionnaire was high due to the idea to include all four skills in the questionnaire, which were accepted as

basic skills that are critical thinking, problem solving, creative thinking and decision making. The opinions of two class teaching experts were obtained regarding the items prepared. As a result of the criticisms and evaluations from the experts, some items were excluded while some new items were added to the questionnaire and various revisions were made in some items. Finally, the number of items has been reduced to 64 according to the opinions of three experts. These items were scaled in five categories as "Strongly Agree", "Agree", "Not Sure", "Disagree" and "Strongly Disagree". The highest score in the questionnaire was 320, and the lowest score was 0. At the end of these studies, the "Questionnaire of Classroom Teacher Candidates' Opinions Regarding Their Use of Thinking Skills" was prepared and finalized.

Data Collection and Analysis

The data collection tools were applied to teacher candidates at the end of the fall semester of 2017-2018 academic year. While collecting data, the participants were given information about the aim of the study, the questionnaire and the principle of volunteerism and they were asked not to write their names on the questionnaires for confidentiality purposes. They took about 20 minutes to respond to the questionnaires. Data were collected from a total of 300 teacher candidates and 20 of them were excluded from the study for various reasons (incomplete filling or random filling), and statistical operations were performed on the data collected from the 280 teacher candidates.

Collected data were scored and coded according to the characteristics of the questionnaire and transferred to computer. For the analysis of the data, "SPSS" 25 software was used. In statistical operations, the level of significance was based on 05. The Kolmogorov-Smirnov normality test was used to determine if the data of the study were within normal distribution. Parametrical statistical techniques were used as the groups showed normal distribution characteristics. In the analysis of the data, t-test and one-way analysis of variance (ANOVA) were used and Scheffe test was used to determine the difference between the groups.

3. Findings

The findings obtained from the analysis of the research data were presented under two titles according to the order of the questions as *the proficiency levels of teacher candidates' thinking skills* and *the changes in proficiency levels according to the variables* discussed.

Findings Related to the Proficiencies of Teacher Candidates' Use of Thinking Skills

Findings related to teacher candidates' proficiencies in using thinking skills are shown in Table 2.

Table 2

The Mean and Standard Deviation Values of the Proficiency Levels of Teacher Candidates in Using Thinking Skills

	N	Minimum score	Maximum score	Total Score	\bar{x}	Std. Error	sd	Variance
Total scores	280	167.00	293.00	62789.00	224.2464	1.38421	23.16220	536.487
Valid	280							

When Table 2 is examined, the arithmetic average of the teacher candidates (N=280) for thinking skills proficiencies was 224.246 and the standard deviation was 23.16220. The total score of the teacher candidates in the questionnaire ranged from 167 to 293. It was understood that the average scores of teacher candidates were over 160, which was the average score that could be obtained from the questionnaire; so the proficiencies of teacher candidates in thinking skills were "slightly above average".

Findings Related to the Changes in Teacher Candidates' Thinking Skills Proficiencies According to Gender, Age, Grade Levels, Frequency of Reading Books and Parents' Educational Levels

The independent group t-test was applied to determine whether teacher candidates' proficiencies of thinking skills differed according to the *gender* variable and the data obtained are presented in Table 3.

Table 3

T-Test Findings of Thinking Skills Proficiencies According to Gender Variable

	N	\bar{X}	sd	sd	t	p
Female	205	224.5561	22.68720			
Male	75	223.4000	24.55166	278	.369	.712

Examining table 3, as a result of the independent group t-test conducted to determine whether the teacher candidates' proficiencies of thinking skills differed significantly according to the gender variable, the difference between the arithmetic mean of female and male teacher candidates was not statistically significant ($p < .050$). In other words, teacher candidates' proficiencies to use thinking skills did not change according to their gender. Table 4 shows the results of independent group t-test conducted to determine whether or not teacher candidates' proficiencies differ according to *age* variable.

Table 4
T-Test Results for Proficiencies of Using Thinking Skills According to Age Variables

	<i>N</i>	\bar{X}	<i>sd</i>	<i>sd</i>	<i>t</i>	<i>p</i>
Younger than 20	89	220.2472	20.67403			
21 and older	191	226.1099	24.05921	278	-1.983	.048*

* P<0.05

As seen in Table 4, in the results of independent group t-test used to determine whether teacher candidates' proficiencies differed significantly according to the age variable, the proficiencies of teacher candidates in using thinking skills differed statistically significantly between those younger than 20 years and those older than 21 years ($t = -1.983$; $p < .050$). The difference was in favor of teacher candidates of 21 years or older. In other words, the thinking skills proficiencies of teacher candidates who were 21 years or older were more positive than of the ones who were 20 years or younger. One-way analysis of variance was used to determine whether the grade level differences between the averages of teacher candidates' thinking skills proficiencies were statistically significant. The results of the analysis were given in table 5.

Table 5
Score Averages of Proficiencies in Using Thinking Skills According to Grade Level Variables and One-Way Anova Test Results

Score	group	<i>d\bar{X} and sd values</i>			ANOVA results					
		<i>d</i>	\bar{X}	<i>sd</i>	Var. K.	KT	<i>sd</i>	KO	D	<i>p</i>
P	1st year	87	217.1724	22.10	Between g.	6491.203	3	2163.734		
	2nd year	64	226.5938	22.05	Within g.	143188.793	276	518.800		
	3rd year	78	227.1154	25.10	Total	149679.996	279		4.171	.007*
	4th year	51	228.9804	20.98						
	Total	280	224.2464	23.16						

* P<0.05

Examining the results of the analysis of variance (Anova) test, used to determine the differences between the teacher candidates' proficiencies in using thinking skills according to the grade level variable, the difference was found to be statistically significant at a level of $p < 0.05$ between the groups [$D = 4.171$, $p < 0.05$]. The level of significance was 0.007. Since the level of significance found was less than 0.05, the difference between the average scores of the teacher candidates' proficiency levels was significant. Scheffe test was used to determine which differences between the averages were significant. Scheffe test results are given in Table 5.1.

Table 5.1
Scheffe Test Results for Score Averages of Thinking Skills Proficiencies by Grade Levels

School Year (i)	School Year (j)	<i>i-j</i>	<i>sd</i>	<i>p</i>
1st year	2nd year	-9.42134	3.75093	.100
	3rd year	-9.94297	3.55169	.052
	4th year	-11.80798*	4.01693	.036
2nd year	1st year	9.42134	3.75093	.100
	3rd year	-.52163	3.84155	.999
	4th year	-2.38664	4.27537	.958
3rd year	1st year	9.94297	3.55169	.052
	2nd year	.52163	3.84155	.999
	4th year	-1.86501	4.10169	.976
4th year	1st year	11.80798*	4.01693	.036
	2nd year	2.38664	4.27537	.958
	3rd year	1.86501	4.10169	.976

Analyzing the Scheffe test results in Table 5.1, it was seen that there was a difference in favor of the fourth year teacher candidates in terms of the score averages for thinking skills proficiencies (=224.2464) compared to the other groups. That is, fourth year teacher candidates assessed their thinking skills proficiencies higher than other grade levels. One-way analysis of variance was used to determine whether the differences between the averages of teacher candidates' thinking skills proficiencies were statistically significant according to *frequency of reading books*. The results of the analysis are given in Table 6.

Table 6
Anova Test for the Proficiency in Thinking Skills According to the Variable of Frequency of Reading Books

Score	Group	<i>d</i> \bar{X} and <i>sd</i> values			ANOVA results					
		d	\bar{X}	sd	Var. K.	KT	sd	KO	D	p
Frequency of reading books	Twice or more a week	61	234.6557	23.37	Between g.	11065.746	2	5532.873		
	1-5 times a month	140	223.9429	21.68	Within g.	138614.250	277	500.412	11.057	.000*
	Once or less a month	79	216.7468	22.77	Total	149679.996	279			
	Total	280	224.2464	23.16						

Examining table 6, it was seen that there was a significant difference in the proficiencies of the teacher candidates according to the reading frequency. Evaluating the results of the variance analysis (Anova), used in order to determine the differences in the proficiency levels of thinking skills of the teacher candidates according to the frequency of reading books (Table 6), a statistically significant difference was found between the groups at the level of $p < 0.05$ [$D = 11,057$, $p < 0.05$]. The level of significance was 0.000. Since the level of significance found was less than 0.05, the difference between the average thinking skill proficiency scores of the teacher candidates was significant according to the frequency of reading books. Scheffe test was used to determine which differences between the averages were significant. Scheffe test results are given in Table 6.1.

Table 6.1.

Scheffe Test for the Proficiency of Using Thinking Skills According to the Variable of Frequency of Reading Books

Frequency of reading books (i)	Frequency of reading books (j)	(i-j)	sd	p
Twice or more a week	1-5 times a month	10.71288*	3.43189	.008
	Once or less a month	17.90890*	3.81285	.000
1-5 times a month	Twice or more a week	-10.71288*	3.43189	.008
	Once or less a month	7.19602	3.14781	.075
Once or less a month	Twice or more a week	-17.90890*	3.81285	.000
	1-5 times a month	-7.19602	3.14781	.075

According to Scheffe test results in Table 6.1, when compared to other groups at 0.05 significance level, it was seen that the average score of proficiency of using thinking skills ($=224.2464$) was in favor of the teacher candidates who read books twice or more in a week. In other words, teacher candidates who have a high frequency of reading books have higher proficiencies in using their thinking skills than those who read less. One-way analysis of variance was used to determine whether the differences between the averages of the teacher candidates' thinking skills proficiencies were statistically significant according to the variable of *mother's educational level*. The results of the analysis are given in table 7.

Table 7

Anova Test for Thinking Skills Proficiencies According to the Variable of Mother's Educational Level

Score	group	<i>d</i> \bar{X} and <i>sd</i> values			ANOVA results					
		d	\bar{X}	sd	Var. K.	KT	sd	KO	D	p
Mother's educational level	Illiterate	18	222.0556	27.96	Between g.	2545.966	4	636.492		
	Primary school	140	225.9429	22.54	Within g.	147134.030	275	535.033		
	Secondary school	40	225.9750	21.25	Total	149679.996	279		1.190	.316
	High school	63	222.9683	25.41						
	University	19	214.4211	17.46						
	Total	280	224.2464	23.16						

Examining table 7, in the results of the anova test conducted to determine whether the proficiencies of teacher candidates in using thinking skills differed significantly according to the mother's educational level variable, no significant difference was found between the teacher candidates thinking skill proficiencies according to the educational levels of their mothers ($p < .050$). One-way analysis of variance was used to determine whether the differences between the averages of the teacher candidates' thinking skills proficiencies

were statistically significant according to the variable of *father's educational level*. The results of the analysis were given in table 8.

Table 8

Anova Test for Thinking Skills Proficiencies According to the Variable of Father's Educational Level

Score	group	$d\bar{X}$ and sd values			ANOVA results					
		d	\bar{X}	sd	Var. K.	KT	sd	KO	D	p
Father's educational level	Illiterate	7	220.2857	26.71	Between	228.393	4	57.098		
	Primary school	99	224.0808	22.86	g- Within	149451.604	275	543.460		
	Secondary school	46	225.7174	23.40	g- Total	149679.996	279		.105	.981
	High school	78	224.3077	23.41						
	University	50	223.6800	23.49						
	Total	280	224.2464	23.16						

Examining table 7, in the results of the anova test conducted to determine whether the proficiencies of teacher candidates in using thinking skills differed significantly according to the mother's educational level variable, no significant difference was found between the teacher candidates thinking skill proficiencies according to the educational levels of their mothers ($p < .050$).

4. Conclusion, Discussion and Recommendations

The results of this research are given below under two main titles according to the findings.

The Results Regarding the Evaluation of the Teacher Candidates' Proficiencies in Using Thinking Skills

- Teacher candidates evaluate their proficiencies in using thinking skills as "*slightly above average*".

Gelen (2002) concluded in the results of the survey he conducted on teachers that the teachers on average found themselves to be "*proficient*" in teaching thinking skills. In this sense, the results of the two studies are similar for dealing with the basic skills and for both the teachers and teacher candidates. In studies on individual thinking skills in Turkey, the thinking skills proficiency levels of teachers and teacher candidates were found to be "*average*", "*slightly above average*" or "*below average*". It is important to note that there are no studies where critical thinking and creative thinking skills were found to be high/proficient in relation to students, teachers and teacher candidates.

Although the results of the studies on critical thinking are similar, they present differences. Korkmaz (2009a, 2009b) has found the critical thinking skills of both teacher candidates and teachers to be "*average*" in his studies. When the literature was examined, *critical thinking* levels were found to be "*average*" in most of the studies (Gökkuş and Delican, 2016; Dayioğlu (2003); Beşoluk and Önder, 2010; Çekiç, 2007; Türüklü and Yeşildere, 2005; Kürüm, 2002).

Çağlayan (2013) found in his study "Investigation of the Relationship Between Scientific Process, Critical Thinking and Creative Thinking Skills in Eighth Grade Students" that the measurement applied regarding the *critical thinking* skills of students (CEDTDX) achieved 51.59% success in all the sub-dimensions and total testing. This result also shows -in the same way as in this study- that critical thinking was "*slightly above average*" in this level of students. Some studies (Polat and Konaş, 2018; Zayıf, 2008; Gülveren, 2007) concluded that *critical thinking* skills were "*not sufficient*".

Different results are also noteworthy in studies related to *problem solving* skills. Altunçekiç and Yaman (2005) reported that teacher candidates considered themselves to be "*proficient*" in *problem solving*. İnel, Evrekli and Türkmen (2011) found in their study that class teacher candidates' *problem solving* skills were "*quite high*". Piji-Küçük (2012)'s work, however, had very different results. In that study, it was found that the *problem solving* skills of music teaching students were "*low*".

Akpınar and Akpınar (2017) found that students had *problem solving* skills "*above average*", and that self-esteem and cautious decision-making scores were "*high*", procrastination and panic decision-making scores were "*average*", and avoidant decision-making scores were "*low*".

Regarding *creative thinking*, Çağ-Adıgüzel (2016) concluded that the level of *creativity* of the classroom teachers was "*below average*" in the study entitled "The Relationship Between the Teachers' Creative Thinking Skills and the Contribution of Teacher Behaviors to the Development of Students' Creative Thinking Skills".

Results Regarding the Changes in Teacher Candidates' Proficiencies in Using Thinking Skills According to Gender, Age, Grade Level, Frequency of Reading Books and Parents' Level of Education

The results obtained from the study are discussed and classified below according to the individual variables.

- *The proficiencies of teacher candidates in using thinking skills do not differ according to gender.*

In some studies about *critical thinking* (Polat and Konaş, 2018; Gökkuş and Delican, 2016; Tabak, 2011; Gök and Erdoğan, 2011; Korkmaz, 2009b; Kürüm, 2002; Dayioğlu, 2003), no significant difference was found between this thinking skill and gender -as in the present study-. In some studies (Toyran, 2015; Çağlayan, 2013; Beşoluk and Önder, 2010; Zayıf, 2008; Ay and Akgöl, 2008; Çekiç, 2007; Gülveren, 2007), significant differences -all in favor of women- were found.

In some studies on *problem solving* skills (Ayları and Aksin, 2011; İnel, Evrekli and Türkmen, 2011; Genç and Kalafat, 2010; Alver, 2005a) no significant difference was found between this skill and gender. Sezen and Paliç (2011) found differently, that girls perceive themselves as positive in this skill. Türkçapar (2009) and Altunçekiç and Yaman (2005) found significant differences in favor of male teacher candidates.

In terms of *decision-making* skills, studies have shown that there was a significant difference between this skill and *gender*. Brown & Mann (1991), on agreeing to family decisions, showed a significant difference in favor of girls, while some of these studies had findings in favor of men (Yüceloğlu-Keskin, Günay-Derebaşı, Bostancı and Kabadayı, 2016). Alver (2005b) concluded that there was a significant difference between independent and instinctive decision-making strategy averages in favor of males, and concluded that there was no significant difference between the mean scores of logical decision-making and instability. Avşaroğlu (2007) did not find any significant difference between genders and self-esteem in decision making and decision-making styles. The results of that and the previous study are similar to the findings of the present study.

In literature, there was no significant difference between *creative thinking* skills and gender, as in the current study (Çağ-Adıgüzel, 2016; Toyran, 2015; Mangır and Cağatay-Aral, 1991; Gönen, Üzmen, Akçin and Özdemir, 1987). Gök and Erdoğan (2011), on the other hand, found that there was a significant difference between the levels of creative thinking and gender -in favor of girls-. In the study of Özmen and Argun (2002), a significant difference was found between the two variables.

- *The proficiencies of teacher candidates in using thinking skills shows a significant difference according to age, in favor of those 21 years and older.*

In the studies of Akpınar and Akpınar (2017) and Tabak (2011), it was reported that there was no significant difference between *critical thinking* and age. Kürüm (2002) concludes that as the age decreased (18-21 years, 22-25 years, older than 25), the levels of deductive thinking skill have increased. In this study, it was revealed that 18-21 years old teacher candidates' interpretation skills were higher than those older than 25 years. Ay and Akgöl (2008) on the other hand -similar to the current study- concluded that students' critical thinking abilities increased as age increased.

Some of the studies related to *decision-making* skills (Davidson, 1991; Levin, Weller, Pederson & Harshman, 2007) -similar to the current study- showed significant differences in favor of older ages, while others (Yüceloğlu-Keskin, Günay-Derebaşı, Bostancı and Kabadayı, 2016; Alver, 2005b) showed significant differences in favor of younger ages.

In the study of Gönen, Üzmen, Akçin and Özdemir (1987), there was no significant difference between *creative thinking* and age (5/6 years). However, girls are more successful in terms of flexibility, originality, enrichment scores. Boys, on the other hand, have scored higher than girls in the fluency criterion of creativity. The results of that study and the results of the current study do not match.

- *According to the grade level, the proficiencies of teacher candidates in using thinking skills showed a significant difference in favor of those in the fourth year.*

Kürüm (2002) did not find a significant difference between *critical thinking* skills and grade levels. The level of interpreting skills of teacher candidates in their first year was higher than that of second year students. Koçak, Kurtlu, Ulaş and Epçaçan (2015) concluded that the first year students' critical thinking tendencies were higher than those of the other students. Ay and Akgöl (2008) concluded that second year students had lower *critical thinking* abilities than first and third year students. Zayıf (2008) concluded that the *critical thinking tendencies* of teacher candidates showed a significant difference according to their grade levels in terms of the total sum and the sub-dimensions of analytical thinking, self-confidence and searching for the truth. While the results of these studies do not coincide with the present study, Gökkuş and Delican (2016) coincide in that there is a meaningful difference in favor of the fourth year, regarding *critical thinking*.

The fact that there is a significant difference between the *problem solving* skill and the grade level coincides with the results of Alver (2005a) in favor of the fourth year teacher candidates. Genç and Kalafat (2010) found a significant difference in favor of the third year teacher candidates compared to the fourth year. In contrast, in the study of Türkçapar (2009), the *problem solving* skills of the third year students were lower among all grade levels. In the studies by Sezen and Paliç (2011) on high school students, Ayları and Aksin (2011) and Altunçekiç and Yaman (2005) on teacher candidates, they found that the *problem-solving* skills of the students studying at different grade levels did not differ significantly.

In the study of Avşaroğlu (2007), no significant difference was found between the *decision-making* styles and the grade variable, whereas Alver (2005b) found a significant difference between the averages of logical and impulsive decision making points according to the grade levels. Akpınar and Akpınar (2017) says Deniz (2002)

found that the instability scores of first year students were high. The results of these studies and the results of the present study are similar in this respect.

- *According to the frequency of reading books, the proficiencies of teacher candidates in using thinking skills differs significantly in favor of those who read more books.*

Polat and Konaş (2018) stated in their work that class teachers who read books every day are people who think more analytically, are more open-minded and more curious compared to those that do not read any books. They interpreted this result as the fact that many people reading books show more tendency to *think critically* than those who read less and those who never read, and found that teachers' reading habits have a significant effect on critical thinking tendency. Similarly, Tabak (2011) found that the frequency of the fourth year teacher candidates in the Department of Music Education reading newspapers makes a significant difference on their *critical thinking* tendencies. It is noteworthy in that this study shows similarity with the current study, which shows that teacher candidates' proficiency in thinking skills are in favor of those who have a higher reading frequency.

- *The proficiency of teacher candidates in using their thinking skills does not differ according to their parents' educational level.*

Examining the results obtained by Toyran (2015), Tabak (2011), Dayıođlu (2003), Çekiç (2007) and Gülveren (2007) no significant difference was found between parents' educational levels and *critical thinking* skills. This finding and the current study support each other.

Polat and Konaş (2018) and Çađlayan (2013) found no significant difference between *critical thinking* skills and mothers' education levels in their studies, though they found a significant difference with fathers' educational levels. Çađlayan (2013) found this difference in favor of students whose fathers had a university degree. Polat and Konaş (2018) found that class teachers whose fathers graduated from primary school and secondary school had a higher tendency to *think critically* than those whose fathers had university education. Beşoluk and Önder (2010) reported that as the level of parents' education increased, the ratio of children having *low critical thinking* tendencies decreased. Kürüm (2002) reported that the *critical thinking* abilities were higher for those whose mothers graduated from universities, also reporting that the abilities were higher for those whose fathers graduated from universities compared to those whose fathers were illiterate.

Regarding *problem solving* skills, Genç and Kalafat (2010) found no significant difference with mothers' educational levels, while they found a significant difference in fathers' educational levels -in favor of university graduates-. Yiđit (2005) in the study titled "High School Students' Decision Making Behavior According to Some Variables", found a significant difference with mothers' education levels (illiterate, literate, primary school, secondary school, high school, university, post graduate) in favor of those whose mothers graduated from high school. The results of these studies do not coincide with the current study.

In the study of Can-Yaşar and Aral (2011), it was concluded that the highest *creative thinking* skills were of the children whose mothers were university graduates, followed by the children whose mothers were high school and primary school graduates. Again, Mangir and Çađatay-Aral (1991) found that parents' educational levels were important in the children's creativity in their study entitled "Investigation of Some Factors Affecting the Creativity of Children of Nine Years in Lower and Higher Socio-Economic Levels".

Suggestions

Based on the results of the study, the recommendations for Ministry of Education, Council of Higher Education and researchers are given below.

Suggestions for Related Institutions

As a result of the fact that there is a significant difference between teacher candidates' proficiencies in thinking skills and grade levels and ages, in favor of older ages and higher grade levels, it can be strongly suggested to increase the ability to develop skills in earlier grades in university education. The Council of Higher Education should work to improve especially the four basic thinking skills in universities. Based on the fact that training programs at all levels improve skills, both MoE and CoHE institutions should develop a yearly practical application of skills integrated in all courses, and these applications should be assessed, evaluated and revised by continuously improving the applications.

Based on the finding that the opinions about these proficiencies are high in the teacher candidates who have a higher frequency of reading books, teacher candidates should be encouraged to read more books and reading lists should be formed for each course to increase their reading frequencies.

Suggestions for Researchers

Based on the results of studies in the Turkish literature dealing with individual thinking skills, it is synthesized that the results show difference according to variables such as gender, age, grade level and parents' educational levels. Therefore, it is advisable to make new studies on how thinking skills interact with various variables.

An important contribution can be made to the literature by carrying out a study on the validity and reliability of

the questionnaire developed and used in the current study, which includes four basic thinking skills.

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