

Evaluation of the Relation between Critical-Thinking Tendency and Problem-Solving Skills of Pre-Service Teachers¹

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ABSTRACT

The purpose of this study is to determine the relationship between critical-thinking tendency and problem-solving skills of pre-service teachers. Research was modelled as relational screening model. The population of the research consisted of pre-service teachers from a faculty of education during the 2013-2014 academic year. The sample of the research consisted of 656 students who were studying different fields of education at the faculty. Stratified sampling method was used in choosing the sample. The variable of students' field was taken as stratified according to the ratio in the population. Facione, Facione, and Giancarlo's (1998) "California Critical Thinking Tendency Inventory" and Heppner and Petersen's (1982) "Problem Solving Inventory" and a personal information form were used to collect the data. The collected data were analyzed with descriptive statistics, parametric tests and correlation analysis. In this study, a near moderate-level and positive correlation was found between the Critical thinking tendency and Problem solving skills of pre-service teachers.

Key Words: Critical thinking, Critical thinking tendency, Problem solving

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INTRODUCTION

The 21st century requires proficiency in critical-thinking and problem-solving skills for individuals. These skills are necessary for serving as a member of society, being active within various institutions and to rival others (Carlgren, 2013). Needs for critical-thinking and problem-solving skills affect educational fields, with education not only providing information to the students, but aiming to raise individuals who can think, examine, and solve problems. Making it possible for students to gain thinking skills is important. For that reason, it is important to raise individuals who think critically and search through information (Seferoğlu & Akbıyık, 2006).

Thinking expresses inferring and the making of significant correlations between concepts and events, whereas problem solving depends on processes such as searching, examining and criticizing an event (Aybek, 2007, as cited in Korkmaz, 2009). Thinking, which is described as a cognitive activity which formulates or solves a problem, and supports decision making and understanding, can be also be applied to guessing, remembering, and exposing unknown subjects (Brabete & Nimalathan, 2010; Kazancı, 1989, as cited in Kuzu & Şentürk, 2010).

Critical thinking is one of the important dimensions of thinking that helps gain knowledge, and solves problems without difficulty (Semerci, 2000, as cited in Korkmaz, 2009), hence critical thinking has an important role in educational life. Students can compare old knowledge versus new and criticize thanks to critical-thinking skills (Kuzu, 2009).

There is a relationship between critical thinking and problem solving. Proficiency in critical thinking can be improved when there isn't only one answer to a problem. In this way, students find out the answer themselves by discovering and evaluating the situation (Paulson, 2011). This development requires proficiency in metacognitive processes which include skills such as planning, observing, evaluating and controlling the cognitive processes of individuals (Abdullah, Halim, & Zakaria, 2013).

It's seen that problem solving, evaluating, and creative thinking are used as synonym in the literature from time to time (Gündoğdu, 2009; Şahinel, 2002, as cited in Zayıf, 2008); however in terms of conceptual characteristics, critical thinking has no universal meaning (Brookfield, 1987). When definitions in the literature are revised, critical thinking is defined as a kind of sensible and reflective thinking which determines what will be believed or fulfilled about a situation (Dam & Volman, 2004, as cited in Durukan & Maden, 2010).

Critical thinking includes skills to observe events and situation by querying, and to comment and decide by investigating. Critical thinking is the process of objective perception. It is also thinking reasonably and figuring out the special meaning (Puccio, Murdock, & Mance, 2011). However, problem solving is to cope with difficulties, to find the solution by applying cognitive process and different thinking skills (e.g., creative and critical thinking) (Çakmak & Tertemiz, 2002, as cited in Arkan, 2011). This process consists of different steps and it includes stages such as determining the problem, analyzing, and finding out and applying the solution (Mert, 1997, as cited in Develioğlu, 2006).

Individuals should pay attention to some situations in order to develop their critical thinking and problem solving. Observing the environment, knowing what can be done in

similar conditions, reasoning by collecting up the pieces are some of these situations (Friedel, İrani, Rhoades, Fuhrman, & Gallo, 2008).

Innovations in education require students to have different thinking skills in order to facilitate the understanding of problems which students encounter, and to enable their educational input to the system. Pithers and Soden (2000) believe that contemporary educational programs help students think better; and in this context, education encourages students to think in a more qualified way. Students are not necessarily good at critical thinking; however, it is expected that education and training should assist in gaining the tendency and attitude related with critical thinking. Individuals educated with such skills graduate from schools as curious, critical, analytical, reflective, learning and adapting easily, problem-solver people and can direct their life in this way.

In order to raise individuals successful in problem solving, it is necessary to ensure they experience as much as possible. They should have the opportunity to think about solving problems which they encounter whilst they are students. Teachers face a great responsibility in equipping school students with the skills of problem solving (Arkan, 2011). Teachers should apply different methods and techniques in order to improve students' problem-solving skills. In addition, teachers can build bridges in order for students to solve problems more effectively, think critically and be more active within the process itself (Choi, Lindquist, & Song, 2013; Cone, Bond, & Pierson, 2013).

Wilks (1995) stated that pre-service teachers need to have these qualifications primarily in order to educate students who can think critically, investigate, participate in discussions, and to look for alternatives (as cited in Aybek, 2007; Zayıf, 2008).

According to İpşiroğlu (1993), there is a dead-end situation across all educational grades, from primary school to university. One of the reasons for this deadlock is that the present educational system prefers traditional approaches to critical thinking. Because of this, both schools and universities are increasing in numbers, but decreasing in value day by day in terms of educational quality as they turn into factories. Within this production mentality, individuals are raised who do not ask questions, do not search, and do not think, yet accept everything they are taught or see (as cited in Aybek, 2007).

Purpose

University students naturally encounter many problems in both their educational and daily lives. Students who have critical-thinking skills tend to find practical solutions to address their problems in just a short time. It is thought that critical thinking tendency, which is necessary for analyzing, affects problem-solving skills. The purpose of this current study is to determine university students' critical-thinking tendency and problem-solving skills, and the correlation between them. In accordance with this general aim, answers are sought to these research questions:

1. What are the critical thinking tendency levels of pre-service teachers in terms of curiosity, analytical skills, open-mindedness, self-confidence, searching for truth and systematic sub-dimensions?
2. What are the problem-solving skill levels of pre-service teachers in terms of being hasty, thoughtful, avoidant, evaluative, self-confident and tactful sub-dimensions?

3. Is there any difference in pre-service teachers' critical thinking tendency and problem-solving skills in terms of variables such as gender, field, grade and academic success?
4. Is there a relationship between pre-service teachers' critical thinking tendency and problem-solving skills?

METHOD

Research Design

This current study, which aims to determine the relationship between pre-service teachers' critical thinking tendency and problem-solving skills, is designed on the relational survey model. Survey model is a research method which describes characteristics such as interest, attitude and skill, or the opinions of participants about a subject or situation (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2013; Karasar, 2008).

Population and Sample

The population of the study is pre-service teachers attending the Education Faculty at Yüzüncü Yıl University (Turkey) during the 2013-2014 academic year. The sample of the study comprises 656 students who studied in different educational fields. These fields are preschool teaching, primary school teaching, Turkish language teaching, social sciences teaching, science and technology teaching, elementary mathematics teaching, computer and teaching technologies teaching, visual arts teaching, music teaching, English language teaching (ELT), chemistry teaching, and biology teaching. Stratified sampling technique was used for sampling. Personal variables concerning these pre-service teachers are shown in Table 1.

Table 1. *Personal variables of the sampling group*

<i>Variable</i>	<i>Level</i>	<i>N</i>	<i>%</i>
Gender	Male	337	51.4
	Female	319	48.6
Field	Basic E.	135	20.6
	T-S. ELT.	144	22.0
	S-M. Comp.	280	42.7
	Fine Arts	97	14.8
Grade	1st grade	224	34.1
	2nd grade	63	9.6
	3rd grade	106	16.2
	4th grade	263	40.1
Academic success	75 or less	434	66.2
	76 or more	222	33.8
<i>Total</i>		<i>656</i>	<i>100.0</i>

Most of the participants studied science and technology, mathematics, computer and teaching technologies fields at the university, as indicated in Table 1 (42.7%). This is due in part to the fields of science and technology, mathematics, computer and technology teaching consisting of five different programs (science and technology teaching, elementary mathematics teaching, computer and teaching technologies teaching, chemistry teaching, biology teaching), while other fields have very few. Pre-service teachers who studied at the

first and fourth grade constituted more than half (74.2%) of the sample. The sample was selected in this way in order to better determine pre-service teachers' level of critical-thinking and problem-solving skills from their first and last years. This rationale is important in terms of presenting skill differences among the grades.

Data Collection Tool

Data for the study were collected through applying the California Critical Thinking Tendency scale (1988) and the Problem Solving Inventory by Facione et al. (1998); plus a personal information form. The California Critical Thinking Tendency scale was adapted to Turkish by Kökdemir (2003) and the Problem Solving Inventory by Şahin, Şahin, and Heppner (1993). Internal consistency of the Critical Thinking Tendency scale, which consists of six dimensions and 51 items, was found to be 0.88, and the total variance was 36.13%.

Analysis of the Data

Data were analyzed by using descriptive statistics such as percentage, arithmetic mean, frequency and standard deviation; inferential statistics such as t-test and one-way ANOVA. Tukey test was utilized in order to discover sub-dimensions which held significant differences. Additionally, correlational analysis was used to determine any relationship between critical thinking and problem solving.

FINDINGS

This section presents the findings related to pre-service teachers' critical-thinking tendencies and problem-solving skills.

Findings Concerning Critical Thinking Tendency

The *t*-test results of participant pre-service teachers' critical-thinking tendencies based on the gender variable are shown in Table 2.

Table 2. Descriptive statistics and *t*-test results of participant pre-service teachers' critical thinking tendencies based on gender variable

Dimensions	Gender	N	\bar{X}	S	sd	t	p																																																																				
Critical thinking (total scale)	Female	317	4.31	.46	654	3.81	.000																																																																				
	Male	319	4.17	.47				Curiosity	Female	337	4.45	.65	654	2.13	.033	Male	319	4.35	.60	Being analytical	Female	337	4.43	.66	654	3.46	.001	Male	319	4.25	.68	Open mindedness	Female	337	4.09	.66	654	1.72	.085	Male	319	4.00	.68	Self-confidence	Female	337	4.33	.70	654	1.82	.068	Male	319	4.23	.72	Searching for truth	Female	337	4.37	.68	654	4.26	.000	Male	319	4.15	.67	Being systematic	Female	337	4.25	.65	654	3.36	.001
Curiosity	Female	337	4.45	.65	654	2.13	.033																																																																				
	Male	319	4.35	.60				Being analytical	Female	337	4.43	.66	654	3.46	.001	Male	319	4.25	.68	Open mindedness	Female	337	4.09	.66	654	1.72	.085	Male	319	4.00	.68	Self-confidence	Female	337	4.33	.70	654	1.82	.068	Male	319	4.23	.72	Searching for truth	Female	337	4.37	.68	654	4.26	.000	Male	319	4.15	.67	Being systematic	Female	337	4.25	.65	654	3.36	.001	Male	319	4.07	.66								
Being analytical	Female	337	4.43	.66	654	3.46	.001																																																																				
	Male	319	4.25	.68				Open mindedness	Female	337	4.09	.66	654	1.72	.085	Male	319	4.00	.68	Self-confidence	Female	337	4.33	.70	654	1.82	.068	Male	319	4.23	.72	Searching for truth	Female	337	4.37	.68	654	4.26	.000	Male	319	4.15	.67	Being systematic	Female	337	4.25	.65	654	3.36	.001	Male	319	4.07	.66																				
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	Male	319	4.00	.68				Self-confidence	Female	337	4.33	.70	654	1.82	.068	Male	319	4.23	.72	Searching for truth	Female	337	4.37	.68	654	4.26	.000	Male	319	4.15	.67	Being systematic	Female	337	4.25	.65	654	3.36	.001	Male	319	4.07	.66																																
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	Male	319	4.23	.72				Searching for truth	Female	337	4.37	.68	654	4.26	.000	Male	319	4.15	.67	Being systematic	Female	337	4.25	.65	654	3.36	.001	Male	319	4.07	.66																																												
Searching for truth	Female	337	4.37	.68	654	4.26	.000																																																																				
	Male	319	4.15	.67				Being systematic	Female	337	4.25	.65	654	3.36	.001	Male	319	4.07	.66																																																								
Being systematic	Female	337	4.25	.65	654	3.36	.001																																																																				
	Male	319	4.07	.66																																																																							

There is a meaningful difference in pre-service teachers' critical-thinking tendencies in terms of the gender variable ($t_{(654)}=3.81$, $p<.05$). There is significant difference for female pre-service teachers in all of the scale sub-dimensions, except open-mindedness and self-confidence. It can therefore be inferred that females have higher level critical-thinking tendencies than males; that generally they are more curious, think more analytically and search for truth more than males. Also, the females stated that they are more systematic, self-confident and open-minded than males. In summary, it was revealed that females have higher levels of critical-thinking tendencies than males.

The *t*-test results of participant pre-service teachers' critical-thinking tendencies based on the academic success variable are shown in Table 3.

Table 3. *Descriptive statistics and t-test results of participant pre-service teachers' critical thinking tendencies based on academic success variable*

<i>Dimensions</i>	<i>Academic success</i>	<i>N</i>	\bar{X}	<i>S</i>	<i>sd</i>	<i>t</i>	<i>p</i>
Critical thinking (total scale)	75 or less	434	4.22	.48	654	-1.86	.063
	76 or more	222	4.29	.46			
Curiosity	75 or less	434	4.37	.57	654	-1.91	.056
	76 or more	222	4.47	.72			
Being analytical	75 or less	434	4.33	.71	654	-0.73	.461
	76 or more	222	4.37	.61			
Open-mindedness	75 or less	434	4.03	.69	654	-0.97	.332
	76 or more	222	4.08	.63			
Self-confidence	75 or less	434	4.26	.77	654	-1.28	.199
	76 or more	222	4.33	.57			
Searching for truth	75 or less	434	4.23	.69	654	-1.91	.056
	76 or more	222	4.33	.67			
Being systematic	75 or less	434	4.13	.66	654	-1.51	.132
	76 or more	222	4.22	.65			

As seen in Table 3, the critical-thinking tendencies of pre-service teachers do not differentiate in terms of the academic success variable ($t_{(654)}=0.63$, $p>.05$). However, the difference in the total scale, curiosity and searching for truth sub scales are close to being significant. Thus, it can be inferred that pre-service teachers with high academic success show relatively higher levels of being curious, searching for the truth and critical-thinking tendencies.

The ANOVA results of participant pre-service teachers' critical thinking tendencies based on the grade variable are shown in Table 4.

Table 4. Descriptive statistics and ANOVA results of participant pre-service teachers' critical thinking tendencies based on grade variable

Dimensions	Grade	N	\bar{X}	S	Source of variance	Total sum of squares	sd	Mean of squares	F	p	Difference
Critical thinking (total scale)	1st	224	4.23	.52	Inter group	.441	3	.147	.639	.59	-
	2nd	63	4.32	.39	Within group	149.978	652	.230			
	3rd	106	4.23	.41	Total	150.419	655				
	4th	263	4.24	.48							
Curiosity	1st	224	4.41	.70	Inter group	.301	3	.100	.251	.86	-
	2nd	63	4.45	.50	Within group	260.267	652	.399			
	3rd	106	4.39	.58	Total	260.568	655				
	4th	263	4.38	.60							
Being analytical	1st	224	4.30	.70	Inter group	.805	3	.268	.577	.63	-
	2nd	63	4.38	.61	Within group	302.961	652	.465			
	3rd	106	4.36	.59	Total	303.765	655				
	4th	263	4.37	.70							
Open minded-ness	1st	224	4.04	.78	Inter group	.801	3	.267	.587	.62	-
	2nd	63	4.13	.53	Within group	296.492	652	.455			
	3rd	106	4.08	.59	Total	297.293	655				
	4th	263	4.02	.63							
Self-confidence	1st	224	4.26	.83	Inter group	.398	3	.133	.257	.85	-
	2nd	63	4.34	.62	Within group	336.779	652	.517			
	3rd	106	4.27	.51	Total	337.178	655				
	4th	263	4.30	.70							
Searching for truth	1st	224	4.22	.69	Inter group	1.774	3	.591	1.240	.29	-
	2nd	63	4.39	.63	Within group	310.871	652	.477			
	3rd	106	4.22	.66	Total	312.645	655				
	4th	263	4.28	.70							
Being systematic	1st	224	4.21	.72	Inter group	3.792	3	1.264	2.906	.03	2-3
	2nd	63	4.32	.55	Within group	283.548	652	.435			
	3rd	106	4.05	.61	Total	287.340	655				
	4th	263	4.13	.64							

As demonstrated in Table 4, there are no significant differences among pre-service teachers' critical-thinking tendencies based on the university grade variable ($F_{(654)}=0.639$, $p>.05$). However, only in the subscale of being systematic, there is a significant difference between grades 2 and 3. Second grade participants expressed that they generally have a higher level of critical thinking tendency than the participants at other grades.

The ANOVA results of participant pre-service teachers' critical thinking tendencies based on field/field variable are shown in Table 5.

Table 5. ANOVA results of participant pre-service teachers' critical-thinking tendencies based on field variable

Dimensions	Field	N	\bar{X}	S	Source of variance	Total sum of squares	sd	Mean of squares	F	p	Difference
Critical thinking (total scale)	Basic E.	135	4.36	.49	Inter group	5.297	3	1.766	7.933	.00	4-1
	T-S. ELT.	144	4.23	.42	Within group	145.122	652	.223			4-2
	S-M.Comp.	280	4.25	.47	Total	150.419	655				4-3
	Fine Arts	97	4.06	.50							
Curiosity	Basic E.	135	4.49	.78	Inter group	2.767	3	.922	2.332	.07	-
	T-S. ELT.	144	4.46	.57	Within group	257.801	652	.395			
	S-M.Comp.	280	4.35	.56	Total	260.568	655				
	Fine Arts	97	4.33	.63							
Being analytical	Basic E.	135	4.44	.62	Inter group	4.651	3	1.550	3.380	.01	4-1
	T-S. ELT.	144	4.30	.70	Within group	299.114	652	.459			4-3
	S-M.Comp.	280	4.38	.70	Total	303.765	655				
	Fine Arts	97	4.17	.62							
Open mindedness	Basic E.	135	4.23	.86	Inter group	9.187	3	3.062	6.930	.00	1-2
	T-S. ELT.	144	4.01	.53	Within group	288.106	652	.442			1-3
	S-M.Comp.	280	4.05	.62	Total	297.293	655				1-4
	Fine Arts	97	3.84	.64							3-4
Self-confidence	Basic E.	135	4.35	.58	Inter group	3.739	3	1.246	2.437	.06	-
	T-S. ELT.	144	4.20	.63	Within group	333.439	652	.511			
	S-M.Comp.	280	4.33	.75	Total	337.178	655				
	Fine Arts	97	4.16	.85							
Searching for truth	Basic E.	135	4.46	.64	Inter group	13.952	3	4.651	110.152	.00	1-3
	T-S. ELT.	144	4.27	.66	Within group	298.693	652	.458			4-1
	S-M.Comp.	280	4.27	.67	Total	312.645	655				4-2
	Fine Arts	97	3.96	.72							4-3
Being systematic	Basic E.	135	4.20	.67	Inter group	.670	3	2.890	6.761	.00	4-1
	T-S. ELT.	144	4.22	.66	Within group	278.670	652	.427			4-2
	S-M.Comp.	280	4.21	.62	Total	287.340	655				4-3
	Fine Arts	97	3.89	.69							

As shown in Table 5, there is a meaningful difference in pre-service teachers' critical-thinking tendencies in terms of their field/ field in which they study ($F_{(654)}=7.933$, $p<.05$). Except for curiosity and self-confidence subscales, there are no significant differences for all subscales based on the field variable. Although there are differences among the groups, the most significant difference is between Arts and other fields. The findings suggest that pre-service teachers in Basic Education, Turkish, Social Sciences, English, and Science/Mathematics/Technology fields have high levels of critical-thinking skill, while those in the Art field show a medium level of critical-thinking tendency.

Findings Related to Problem-Solving Skills

The descriptive statistics and t-test results of participant pre-service teachers' problem-solving skills based on gender variable, are shown in Table 6.

Table 6. Descriptive statistics and t-test results of participant pre-service teachers' problem-solving skills based on gender variable

Dimensions	Gender	N	\bar{X}	S	Sd	t	p																																																																				
Problem Solving (total scale)	Female	337	4.01	.68	654	2.55	.01																																																																				
	Male	319	3.87	.66				Hasty	Female	337	3.10	5.72	654	-1.34	.17	Male	319	3.19	5.24	Thoughtful	Female	337	3.89	3.58	654	.184	.06	Male	319	3.76	3.33	Avoidant	Female	337	2.77	2.89	654	-0.84	.40	Male	319	2.84	3.20	Evaluative	Female	337	4.09	2.20	654	2.24	.02	Male	319	3.86	2.06	Self-confident	Female	337	3.86	2.32	654	1.98	.04	Male	319	3.72	2.07	Tactful	Female	337	4.06	3.57	654	.199	.04
Hasty	Female	337	3.10	5.72	654	-1.34	.17																																																																				
	Male	319	3.19	5.24				Thoughtful	Female	337	3.89	3.58	654	.184	.06	Male	319	3.76	3.33	Avoidant	Female	337	2.77	2.89	654	-0.84	.40	Male	319	2.84	3.20	Evaluative	Female	337	4.09	2.20	654	2.24	.02	Male	319	3.86	2.06	Self-confident	Female	337	3.86	2.32	654	1.98	.04	Male	319	3.72	2.07	Tactful	Female	337	4.06	3.57	654	.199	.04	Male	319	3.88	3.28								
Thoughtful	Female	337	3.89	3.58	654	.184	.06																																																																				
	Male	319	3.76	3.33				Avoidant	Female	337	2.77	2.89	654	-0.84	.40	Male	319	2.84	3.20	Evaluative	Female	337	4.09	2.20	654	2.24	.02	Male	319	3.86	2.06	Self-confident	Female	337	3.86	2.32	654	1.98	.04	Male	319	3.72	2.07	Tactful	Female	337	4.06	3.57	654	.199	.04	Male	319	3.88	3.28																				
Avoidant	Female	337	2.77	2.89	654	-0.84	.40																																																																				
	Male	319	2.84	3.20				Evaluative	Female	337	4.09	2.20	654	2.24	.02	Male	319	3.86	2.06	Self-confident	Female	337	3.86	2.32	654	1.98	.04	Male	319	3.72	2.07	Tactful	Female	337	4.06	3.57	654	.199	.04	Male	319	3.88	3.28																																
Evaluative	Female	337	4.09	2.20	654	2.24	.02																																																																				
	Male	319	3.86	2.06				Self-confident	Female	337	3.86	2.32	654	1.98	.04	Male	319	3.72	2.07	Tactful	Female	337	4.06	3.57	654	.199	.04	Male	319	3.88	3.28																																												
Self-confident	Female	337	3.86	2.32	654	1.98	.04																																																																				
	Male	319	3.72	2.07				Tactful	Female	337	4.06	3.57	654	.199	.04	Male	319	3.88	3.28																																																								
Tactful	Female	337	4.06	3.57	654	.199	.04																																																																				
	Male	319	3.88	3.28																																																																							

Upon reviewing Table 6, it can be seen that there is a meaningful difference in pre-service teachers' problem-solving skills in terms of the gender variable ($t_{(654)}=2.55$, $p<.05$). Female pre-service teachers claim to have more problem-solving skills than male pre-service teachers. While there is no significant difference in the subscales of hasty, thoughtful and avoidant, there is a significant difference in terms of the gender variable in the subscales of being evaluative, self-confident and tactful. Thus, female pre-service teachers have more positive attitudes towards being evaluative, self-confident and tactful.

The descriptive statistics and t-test results of participant pre-service teachers' problem solving skills based on academic success variable, are shown in Table 7.

Table 7. Descriptive statistics and t-test results of participant pre-service teachers' problem-solving skills based on academic success variable

Dimensions	Academic success	N	\bar{X}	S	Sd	t	p																																																																				
Problem Solving (total scale)	75 or less	434	3.89	.65	654	-2.76	.00																																																																				
	76 or more	222	4.05	.72				Hasty	75 or less	434	3.21	.89	654	2.66	.00	76 or more	222	3.02	.84	Thoughtful	75 or less	434	3.79	.91	654	-1.51	.12	76 or more	222	3.90	.94	Avoidant	75 or less	434	2.86	1.11	654	1.79	.07	76 or more	222	2.69	1.11	Evaluative	75 or less	434	3.97	1.24	654	-0.20	.83	76 or more	222	3.99	1.32	Self-confident	75 or less	434	3.75	.88	654	-1.49	.13	76 or more	222	3.87	1.00	Tactful	75 or less	434	3.92	1.12	654	-1.68	.09
Hasty	75 or less	434	3.21	.89	654	2.66	.00																																																																				
	76 or more	222	3.02	.84				Thoughtful	75 or less	434	3.79	.91	654	-1.51	.12	76 or more	222	3.90	.94	Avoidant	75 or less	434	2.86	1.11	654	1.79	.07	76 or more	222	2.69	1.11	Evaluative	75 or less	434	3.97	1.24	654	-0.20	.83	76 or more	222	3.99	1.32	Self-confident	75 or less	434	3.75	.88	654	-1.49	.13	76 or more	222	3.87	1.00	Tactful	75 or less	434	3.92	1.12	654	-1.68	.09	76 or more	222	4.08	1.23								
Thoughtful	75 or less	434	3.79	.91	654	-1.51	.12																																																																				
	76 or more	222	3.90	.94				Avoidant	75 or less	434	2.86	1.11	654	1.79	.07	76 or more	222	2.69	1.11	Evaluative	75 or less	434	3.97	1.24	654	-0.20	.83	76 or more	222	3.99	1.32	Self-confident	75 or less	434	3.75	.88	654	-1.49	.13	76 or more	222	3.87	1.00	Tactful	75 or less	434	3.92	1.12	654	-1.68	.09	76 or more	222	4.08	1.23																				
Avoidant	75 or less	434	2.86	1.11	654	1.79	.07																																																																				
	76 or more	222	2.69	1.11				Evaluative	75 or less	434	3.97	1.24	654	-0.20	.83	76 or more	222	3.99	1.32	Self-confident	75 or less	434	3.75	.88	654	-1.49	.13	76 or more	222	3.87	1.00	Tactful	75 or less	434	3.92	1.12	654	-1.68	.09	76 or more	222	4.08	1.23																																
Evaluative	75 or less	434	3.97	1.24	654	-0.20	.83																																																																				
	76 or more	222	3.99	1.32				Self-confident	75 or less	434	3.75	.88	654	-1.49	.13	76 or more	222	3.87	1.00	Tactful	75 or less	434	3.92	1.12	654	-1.68	.09	76 or more	222	4.08	1.23																																												
Self-confident	75 or less	434	3.75	.88	654	-1.49	.13																																																																				
	76 or more	222	3.87	1.00				Tactful	75 or less	434	3.92	1.12	654	-1.68	.09	76 or more	222	4.08	1.23																																																								
Tactful	75 or less	434	3.92	1.12	654	-1.68	.09																																																																				
	76 or more	222	4.08	1.23																																																																							

As shown in Table 7, the problem-solving skills of pre-service teachers differ significantly in terms of academic success ($t_{(654)}=-2.76$, $p<.05$). In this context, pre-service teachers with high academic levels have more problem-solving skills. Considering the subscales, pre-service teachers with academic success of less than 75 were found to be more hasty in the problem solving process.

ANOVA results of participant pre-service teachers' problem-solving skills based on grade variable are given in Table 8.

Table 8. Descriptive statistics and ANOVA results of participant pre-service teachers' problem-solving skills based on grade variable

Dimensions	Grade	N	\bar{X}	S	Source of variance	Total sum of squares	sd	Mean of squares	F	p
Problem Solving (total scale)	1st	224	3.92	.62	Inter group	.354	3	.118	.253	.86
	2nd	63	3.92	.79	Within group	304.836	652	.468		
	3rd	106	3.97	.70	Total	305.190	655			
	4th	263	3.96	.69						
Hasty	1st	224	3.20	.91	Inter group	2.324	3	.775	1.002	.39
	2nd	63	3.18	.83	Within group	504.163	652	.773		
	3rd	106	3.02	.83	Total	506.487	655			
	4th	263	3.14	.87						
Thoughtful	1st	224	3.82	.98	Inter group	1.702	3	.567	.660	.57
	2nd	63	3.91	.85	Within group	560.173	652	.859		
	3rd	106	3.73	.89	Total	561.876	655			
	4th	263	3.86	.90						
Avoidant	1st	224	2.88	1.12	Inter group	2.419	3	.806	.648	.58
	2nd	63	2.71	1.17	Within group	811.813	652	1.245		
	3rd	106	2.75	1.08	Total	814.231	655			
	4th	263	2.78	1.10						
Evaluative	1st	224	3.97	1.28	Inter group	.839	3	.280	.173	.91
	2nd	63	3.93	1.20	Within group	1055.343	652	1.619		
	3rd	106	3.92	1.32	Total	1056.182	655			
	4th	263	4.02	1.25						
Self-confident	1st	224	3.74	3.74	Inter group	1.220	3	.407	.472	.70
	2nd	63	3.78	3.78	Within group	561.530	652	.861		
	3rd	106	3.79	3.79	Total	562.750	655			
	4th	263	3.84	3.84						
Tactful	1st	224	3.98	1.14	Inter group	.749	3	.250	.182	.90
	2nd	63	3.93	1.20	Within group	893.511	652	1.370		
	3rd	106	3.91	1.25	Total	894.261	655			
	4th	263	4.00	1.15						

As presented in Table 8, the problem-solving skills of pre-service teachers do not show any meaningful differences in the total scale and all subscales based on university grade variable ($F_{(654)}=0.253$, $p>.05$).

ANOVA results of participant pre-service teachers' problem-solving skills based on field variable are given in Table 9.

Table 9. ANOVA results of participant pre-service teachers' problem-solving skills based on field variable

Dimension	Field	N	\bar{X}	ss	Source of variance	Total sum of squares	sd	Mean of squares	F	p	Difference
Problem Solving (total scale)	Basic E.	135	4.06	.68	Inter group	10.197	3	3.399	7.513	.00	4-1
	T-S. ELT	144	3.98	.64	Within group	294.993	652	.452			
	S-M.Comp.	280	3.97	.72	group	305.190	655				
	Fine Arts	97	3.66	.50	Total						
Hasty	Basic E.	135	3.08	.84	Inter group	2.452	3	.817	1.057	.36	-
	T-S. ELT	144	3.17	.80	Within group	504.035	652	.773			
	S-M.Comp.	280	3.12	.86	group	506.487	655				
	Fine Arts	97	3.28	1.06	Total						
Thoughtful	Basic E.	135	3.93	.86	Inter group	14.135	3	4.712	5.609	.00	1-4
	T-S. ELT	144	3.96	.83	Within group	547.740	652	.840			
	S-M.Comp.	280	3.83	.86	group	561.876	655				
	Fine Arts	97	3.50	1.20	Total						
Avoidant	Basic E.	135	2.69	1.12	Inter group	16.499	3	5.500	4.495	.01	4-1
	T-S. ELT	144	2.74	1.04	Within group	797.732	652	1.224			
	S-M.Comp.	280	2.76	1.08	group	814.231	655				
	Fine Arts	97	3.18	1.22	Total						
Evaluative	Basic E.	135	4.19	1.23	Inter group	17.629	3	5.876	3.689	.00	4-1
	T-S. ELT	144	3.98	1.18	Within group	1038.553	652	1.593			
	S-M.Comp.	280	4.00	1.27	group	1056.182	655				
	Fine Arts	97	3.63	1.36	Total						
Self-confident	Basic E.	135	3.90	.78	Inter group	12.747	3	4.249	5.037	.00	4-1
	T-S. ELT	144	3.86	.94	Within group	550.003	652	.844			
	S-M.Comp.	280	3.82	.86	group	562.750	655				
	Fine Arts	97	3.47	1.16	Total						
Tactful	Basic E.	135	4.12	1.06	Inter group	16.488	3	5.496	4.082	.00	4-1
	T-S. ELT	144	4.05	1.15	Within group	877.773	652	1.346			
	S-M.Comp.	280	3.99	1.16	group	894.261	655				
	Fine Arts	97	3.61	1.27	Total						

As seen in Table 9, there are differences in pre-service teachers' problem-solving skills in terms of their field/ field in which they study ($F_{(654)}=7.513$, $p<.05$). Hence, pre-service teachers studying arts have less problem-solving skills than others. Also, it was found that these pre-service teachers are more hasty and avoidant, or less thoughtful, evaluative, self-confident and tactful.

Findings Related to Pre-service teachers' Critical-Thinking Tendencies and Problem-Solving Skills

The findings related to pre-service teachers' critical thinking tendencies and problem solving skills are presented in Table 10.

Table 10. Correlation results concerning the relationship between critical-thinking tendencies and problem-solving skills of the participant pre-service teachers

		Hasty	Thoughtful	Avoidant	Evaluative	Self-confident	Tactful	PROBLEM SOLVING
Curiosity	r	-.085*	.124**	-.084*	.131**	.137**	.129**	.173**
	p	.030	.002	.032	.001	.000	.000	.000
Being analytical	r	-.131**	.126**	-.136**	.175**	.170**	.132**	.217**
	p	.001	.001	.000	.000	.000	.000	.000
Open-mindedness	r	-.150**	.150**	-.152**	.154**	.179**	.157**	.245**
	p	.000	.000	.000	.000	.000	.000	.000
Self-confidence	r	-.099*	.136**	-.156**	.116**	.139**	.155**	.196**
	p	.001	.000	.000	.003	.000	.000	.000
Searching for Truth	r	-1.16**	.223**	-.173**	.181**	.192**	.202**	.260**
	p	.003	.000	.000	.000	.000	.000	.000
Being Systematic	r	-.073	.179**	-.156**	.207**	.193**	.209**	.242**
	p	.062	.000	.000	.000	.000	.000	.000
CRITICAL THINKING	r	-.161**	.215**	-.199**	.224**	.236**	.225**	.312**
	p	.000	.000	.000	.000	.000	.000	.000

**p<.01, *p<.05

As can be seen in Table 10, there is a meaningful relationship between the critical-thinking tendencies and the problem-solving skills of pre-service teachers. According to Büyüköztürk et al. (2013), in correlation studies, coefficients of less than 0.30 indicate weak relations; coefficients between 0.31 and 0.70 indicate a medium level of relations and coefficients higher than 0.70 indicate a high level relation. In this sense, it can be concluded that the relationship between critical-thinking skills and problem-solving skills of pre-service teachers are at a medium level, positive and meaningful ($r = 0.31$, $p = 0,00$). In other words, a one-unit increase in critical-thinking tendency generates a 0.3 unit increase in problem-solving skills.

Considering the relationship between the subscales of critical-thinking tendency and problem-solving skills, there is a positive, significant and important relationship between curiosity, being analytical, open-mindedness, self-confidence, searching for truth and being systematic subscales of critical-thinking tendency, and being thoughtful, evaluative, self-confident and tactful subscales of problem-solving skills ($p < .05$). On the other hand, there is a negative and significant relationship between curiosity, being analytical, open-mindedness, self-confidence, searching for truth and being systematic subscales of critical-thinking tendency, and being hasty and avoidant subscales of problem-solving skills, which is also an important relation ($r < -0.30$; $p < .05$).

CONCLUSION, DISCUSSION, AND SUGGESTIONS

The value of critical thinking and problem solving in the education system is ever-increasing. It is of vital importance that students gain critical-thinking and problem-solving skills and to enable them to make use of them in their daily lives. At this point teachers undertake most of the responsibility. Thus, pre-service teachers are ideally expected to gain these skills themselves. Pre-service teachers who do not adopt these skills during their

educational lives feel themselves inadequate when they start to educate students. In their studies, Garcia and Hooper (2011), revealed that teachers do not really know how to cultivate thinking skills in students.

This current study, which aims to determine the relationship between critical-thinking and problem-solving skills, demonstrated that pre-service teachers are of medium level in critical-thinking and problem-solving skills, which can be interpreted as these pre-service teachers are not at the desired level in these domains. This finding is in accordance with studies by Özdemir (2005), Kürüm (2002), Şen (2009), and Aybek and Narin (2010). This incompetency among pre-service teachers can be related to the culture in which there is no place for criticism and questioning, only acceptance and obedience. This culture presents a test-focused education system with readymade options rather than stimulating to question, criticize and think.

This current study concluded that female pre-service teachers have a higher level of critical-thinking tendencies than male pre-service teachers. The studies of Zayıf (2008) "Pre-service teachers' Critical Thinking Tendencies" and Küçük (2007) "The relationship between critical thinking tendencies and emotional intelligence levels of pre-service teachers" were consistent with the results of this current study. This may stem from the fact that females focus on and deal with events in a more analytical, tactful and detailed way. However, other research indicates different results. They suggest that male pre-service teachers have higher levels of critical-thinking tendencies than female pre-service teachers (Bökeoğlu & Yılmaz, 2005) or gender has no effect on critical-thinking tendencies (Aybek, 2007; Kökdemir, 2003; Kürüm, 2002; Tümkaya, Aybek, & Aldağ, 2009). Also, some other studies suggest a significant difference on behalf of females in problem-solving skills. In their study called "Teacher Opinions Concerning Development of Critical Thinking Skills by the Primary Curriculum", Kuzu and Şentürk (2010) reached similar results.

Additionally, there have been found specific differences in the total scale and being evaluative subscales in terms of problem-solving skills. Females think they have higher levels of critical-thinking tendencies and problem-solving skills than males; which could be explained by their relatively curious and questioning tendencies and their higher level of openness to learn new things. Future studies could research the reasons for this situation.

This current study has shown that the field/ or field that pre-service teachers' study influences their critical-thinking tendencies. The differences based on the field/field variable are between arts and other fields. The biggest difference is in the basic education field, while the least difference found is in the arts field. The study findings suggest that pre-service teachers in arts field have lower level critical-thinking tendencies than those in other fields, which may stem from the courses given or the exam system of the field. Similarly, Tümkaya et al. (2009) and Zayıf (2008) proposed that the variable of field/field can influence the critical thinking levels of agents.

Although problem-solving skills of participant pre-service teachers does not differ based on university grade in the study of their critical-thinking tendency, there is a difference in the being systematic subscale between second and third graders, which leans towards second graders. The findings of studies by Altunçekiç, Yaman, and Koray (2005), and Serin (2001) are consistent with this finding. On the contrary, Durukan and Maden (2010) and Akar (2007) emphasized studies in the literature that indicate significant differences based on grade variable. That fourth graders have higher levels of critical

thinking is an expected result in the study. Otherwise, it could be interpreted that university education would have a limited effect on pre-service teachers' critical-thinking tendencies.

There is a significant difference based on academic success for critical-thinking tendencies and problem-solving skills. High transcripts of pre-service teachers contribute to their critical-thinking and problem-solving skills. This situation can be interpreted that critical-thinking and problem-solving skills of pre-service teachers affect their academic success. This finding is in accordance with the findings of studies by Korkmaz (2009), Kökdemir (2003), and Aybek (2007). Pre-service teachers who have high transcript are thought to have more critical-thinking tendencies and problem-solving skills than low transcript. Seferoğlu and Akbıyık's (2002) study called "Critical thinking and teaching" also supports this result.

When the result of correlation analysis is evaluated, there was a meaningful difference found between critical-thinking tendency and problem-solving skill. This result is parallel with the findings of Tümkaya et al. (2009). For this reason, it can be said that critical thinking can positively support the ability to solve problems. There is a negative relationship between hasty and avoidant sub-dimensions of problem solving and the sub-dimensions of critical thinking. While pre-service teachers who have high critical-thinking tendency give reasonable answers, the others try to find answers in a shorter way. Kökdemir (2003) reported similar results in his study called "Deciding and problem solving in uncertain situations". Correlation analysis indicates that pre-service teachers that are curious, analytical, tolerant, self-confident, and give importance to the truth don't behave hasty and avoidable while they are solving problems. Instead, they behave more systematic and planned and think in detail, evaluate the situations and rely on themselves and behave in a planned way during the problem-solving process.

Humanity is the common product of genetics and the environment. Environmental factors have a determinant effect on agent's thoughts, behaviors and skills. In this sense, a critical-thinking skill is related to the cultural features of a society, family upbringing, and education received in schools. In order to cultivate a critical-thinking culture, especially in the family and within schools, children should be encouraged to wonder, question, ask, and adopt a critical approach towards people, decisions and actions around them, and to act in systematic and analytic ways. Such behaviors are considered important steps towards creating a culture in which critical thinking exists. The developments of skills like critical thinking and its important subscales of being curious, open-minded, questioning, self-confident, thinking and acting in an analytic and systematic way would considerably contribute to the development of agents' problem-solving and coping skills. Hence attention should be paid to ensuring there are courses within the syllabuses of the education system which help students improve their skills to think, analyze and evaluate.

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Öğretmen Adaylarının Eleştirel Düşünme Eğilimleri ve Problem Çözme Becerileri Arasındaki İlişkinin İncelenmesi⁴

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Giriş

Eleştirel düşünme ve problem çözme becerilerine önemli ölçüde ihtiyaç duyulmaktadır. Bu ihtiyaç, eğitim alanına da yansımakta ve eğitim; öğrencilere sadece bilgi öğretmekle yeterli görmemekte, düşünen, sorgulayan, problem çözen bireyler yetiştirmeyi hedeflemektedir. Öğrencilere düşünme becerilerini kazandırabilmek oldukça önemlidir. Bu nedenle, okullarda eleştirel düşünebilen, bilgiyi araştıran, sorgulayan bireylerin yetiştirilmesi önemli görülmektedir (Seferoğlu & Akbıyık, 2006). Bilgiye kolay ulaşabilme ve problemleri zorlanmadan aşabilme, düşünmenin önemli bir boyutu olan eleştirel düşünme sayesinde oluşmaktadır (Semerci, 2000 Akt: Korkmaz, 2009). Bu nedenle eleştirel düşünme, eğitim hayatında önemli bir role sahiptir. Öğrenciler, bu düşünme becerisi sayesinde bilgileri yorumlayabilmekte, eski bilgileri yenileriyle karşılaştırabilmekte ve kritik edebilmektedir (Kazu, 2009).

Eleştirel düşünme ve problem çözme birbiriyle bağlantılıdır. Eleştirel düşünme yeterliği, araştırılan problemin tek bir cevabı olmadığında geliştirilebilir. Böylece öğrenciler durumu değerlendirir, keşfeder; başka bir ifade ile bilgileri beyin süzgecinden geçirerek analiz eder ve cevaba kendileri ulaşırlar (Paulson, 2011). Eleştirel düşünme ve problem çözme becerilerini geliştirmek için bireyin dikkat etmesi gereken durumlar vardır. Çevredeki olayları gözlemlemek, geçmişte benzer durumlarda ne yapıldığını bilmek, hatırlanan ve gözlemlenen parçaları bir araya getirerek muhakeme yapmak bu durumlar arasında gösterilebilir (Friedel, İrani, Rhoades, Fuhrman, & Gallo, 2008).

Çağdaş eğitim programları, öğrencilere daha iyi düşünceleri için yardım etme konusunda uzlaşmıştır ve bu bağlamda eğitim, öğrencileri kaliteli düşünmeye teşvik etmektedir. Öğrencilerin tümü, eleştirel düşünmede iyi değildir. Eğitim ve öğretimin, öğrencilere eleştirel düşünme ile ilgili olduğu düşünülen eğilim ve tutumları kazandırmada yardımcı olması beklenmektedir (Pithers & Soden, 2000). Problem çözümede başarılı bireyler yetiştirmek için, onlara öğrencilik yıllarında, karşılaştıkları problemleri nasıl çözebileceklerine dair çok fazla düşüncelerine ve mümkün olduğunca fazla deneyim yaşamalarına olanak sağlamak gerekmektedir. Problem çözme becerisinin okullarda kazandırılabilmesi için öğretmenlere büyük sorumluluklar düşmektedir (Arkan, 2011).

Yöntem

Öğretmen adaylarının, eleştirel düşünme becerileri ile problem çözme becerileri arasındaki ilişkiyi belirlemeyi amaçlayan bu araştırma, ilişkisel tarama modelinde desenlenmiştir. Tarama modeli; bir konu veya durum hakkında katılımcıların görüşlerinin

⁴ Bu çalışma Eylül, 2014 tarihinde İstanbul, Yıldız Teknik Üniversitesi'nde "Yıldız International Conference on Educational Research and Social Sciences" adlı kongrede sözlü bildiri olarak sunulmuştur.

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ya da ilgi, yetenek ve tutum gibi özelliklerinin betimlendiği araştırma modelidir (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2013; Karasar, 2008).

Araştırmanın evreni, 2013-2014 eğitim öğretim yılında Yüzüncü Yıl Üniversitesi Eğitim Fakültesi'nde öğrenim gören öğretmen adaylarıdır. Araştırmanın örneklemini, Yüzüncü Yıl Üniversitesi Eğitim Fakültesi'nde farklı bölümlerde (Okul Öncesi Öğretmenliği, Sınıf Öğretmenliği, Türkçe Öğretmenliği, Sosyal Bilgiler Öğretmenliği, Fen ve Teknoloji Öğretmenliği, İlköğretim Matematik Öğretmenliği, Bilgisayar Öğretmenliği, Resim Öğretmenliği, Müzik Öğretmenliği, İngilizce Öğretmenliği, Kimya Öğretmenliği ve Biyoloji Öğretmenliği) öğrenim gören 656 öğrenci oluşturmaktadır. Toplamda 12 bölüm Örnekleme seçiminde oranlı-tabakalı örnekleme tekniği kullanılmıştır. Öğretmen adaylarının üniversiteye ilk başladıkları dönem ve mezun olacakları dönemde ne düzeyde eleştirel düşünme ve problem çözme becerilerine sahip olduklarını belirlemek için örnekleme bu şekilde seçilmiştir. Sınıflar arası beceri farklılıklarını daha net bir şekilde ortaya koyabilmek amaçlandığı için bu oransal dağılım önemli görülmektedir.

Araştırma verileri; Facione, Facione ve Giancarlo tarafından 1998 de geliştirilen "California Eleştirel Düşünme Eğilimleri Ölçeği" ve Heppner ve Petersen (1982) tarafından geliştirilen "Problem Çözme Envanteri" ve Kişisel Bilgi Formu kullanılarak toplanmıştır. California Eleştirel Düşünme Eğilimleri Ölçeği, Kökdemir tarafından (Kökdemir, 2003; Problem Çözme Envanteri ise Şahin, Şahin ve Heppner (1993) tarafından Türkçe'ye uyarlanmıştır. Toplam 6 boyut ve 51 maddeden oluşan Eleştirel Düşünme Eğilimi Ölçeğinin iç tutarlılık katsayısı (alfa) .88 olarak bulunmuştur. Ölçeğin açıkladığı toplam varyans ise % 36.13'tür.

Verilerin çözümlenmesinde betimsel istatistik (yüzde, frekans, aritmetik ortalama, standart sapma), değişkenlere (cinsiyet, akademik başarı, sınıf, alan) göre farklılaşmanın olup olmadığını görebilmek amacıyla parametrik testler (t-testi, tek yönlü varyans analizi (ANOVA) ve aralarındaki ilişkiyi belirlemek için ise korelasyon analizi kullanılmıştır. Anlamlı farklılık çıkan alt boyutları belirlemek amacıyla Tukey testinden yararlanılmıştır.

Bulgular

Öğretmen adaylarının eleştirel düşünme eğilimlerinde cinsiyet değişkenine göre anlamlı bir fark görülmektedir ($t_{(654)}=3.81, p<.05$). Öğretmen adaylarının eleştirel düşünme eğilimleri akademik başarı değişkenine farklılaşmamaktadır ($t_{(654)}=0.63, p>.05$). Ancak eleştirel düşünme ölçeği toplamında ve meraklılık ile doğruyu aram alt boyutlarındaki farklılık anlamlı düzeye yakındır. Öğretmen adaylarının eleştirel düşünme eğilimleri sınıf değişkeni açısından anlamlı bir fark göstermemektedir ($F_{(654)}=0.639, p>.05$). Yalnızca sistematiklik alt boyutunda 2. ve 3. sınıf arasında bir farklılık olduğu görülmektedir. Öğretmen adaylarının eleştirel düşünme eğilimleri arasında okudukları alana/bölüme göre anlamlı farklılık belirlenmiştir ($F_{(654)}=7.933, p<.05$). Meraklılık ve kendine güven haricindeki diğer tüm alt boyutlarda alan değişkenine göre belirgin farklar bulunmaktadır. Bölümler arasında farklar görülmesine rağmen en anlamlı fark güzel sanatlar ve diğer bölümler arasında ortaya çıkmıştır.

Öğretmen adaylarının problem çözme becerilerinde cinsiyet değişkenine göre anlamlı farklılık olduğu görülmektedir ($t_{(654)}=2.55, p<.05$). Öğretmen adaylarının problem çözme becerileri akademik başarılarına göre anlamlı farklılık göstermektedir ($t_{(654)}=-2.76, p<.05$).

Öğretmen adaylarının problem çözme becerileri okudukları sınıf değişkenine göre ölçek toplamında ve alt boyutlarda anlamlı farklılık göstermemektedir ($F_{(654)}= 0.253, p>.05$).

Öğretmen adaylarının problem çözme becerileri öğrenim gördükleri bölüm değişkenine göre farklılaşmaktadır ($F_{(654)}=7.513, p<.05$). Buna göre güzel sanatlar eğitimi bölümünde öğrenim gören öğretmen adayları, diğer bölümlerde öğrenim gören öğretmen adaylarına göre problem çözme becerilerinde daha yetersiz olduklarını düşünmektedir.

Öğretmen adaylarının eleştirel düşünme eğilimi ile problem çözme becerileri arasında anlamlı ilişki bulunmuştur. Büyüköztürk'e (2013) göre, korelasyonel araştırmalarda 0.30'dan düşük olan katsayı zayıf ilişkiyi, 0.30-0.70 arasındaki kat sayı orta düzeyli ilişkiyi, 0.70 den büyük olan katsayı ise yüksek ilişkiyi betimler. Buna göre öğretmen adaylarının eleştirel düşünme becerileri ile problem çözme becerileri arasında orta düzeye yakın pozitif ve anlamlı bir ilişki olduğu söylenilebilir ($r= 0.31, p= 0,00$).

Eleştirel düşünme ve problem çözme becerisinin alt boyutları arasındaki ilişkiye bakıldığında eleştirel düşünmenin meraklılık, analitiklik, açık fikirlilik, kendine güven, doğruyu arama ve sistematiklik boyutları ile problem çözmenin düşünen, değerlendirici, kendine güvenen ve planlılık boyutları arasında pozitif, anlamlı ve önemli bir ilişki olduğu görülmektedir ($p<.05$). Buna karşın eleştirel düşünme eğiliminin meraklılık, analitiklik, açık fikirlilik, kendine güven, doğruyu arama ve sistematiklik boyutları ile problem çözme becerisinin aceleci ve kaçınan olma yaklaşımları arasında negatif yönlü anlamlı bir ilişki bulunmaktadır ($r<-0.30; p<.05$) ve bu ilişki önemlidir.

Sonuç, Tartışma ve Öneriler

Eleştirel düşünme eğilimi ve problem çözme becerisi arasındaki ilişkiyi belirlemeye yönelik yapılan bu araştırma, öğretmen adaylarının orta düzeye yakın eleştirel düşünme ve problem çözme becerilerine sahip olduklarını göstermektedir. Bu sonuç, öğretmen adaylarının eleştirel düşünme ve problem çözme becerilerini kullanmada beklenen düzeyde olmadıkları şeklinde yorumlanabilir. Bu bulgu Özdemir (2005), Kürüm (2002), Şen (2009), Aybek ve Narin (2010) tarafından yapılan çalışmalarda ortaya çıkan bulgularla benzerlik göstermektedir. Öğretmen adaylarının bu becerilerde yetersiz olma durumunun, eleştiri ve sorgulamadan çok, kabul ve itaate dayanan kültürle; sorgulama ve eleştiriye fazla yer vermeyen, düşünme ve sorgulama yerine verilen hazır seçeneklerle düşünmeye sevk eden test odaklı eğitim sistemiyle ilişkili olduğu söylenebilir.

Bu çalışmada, kadın öğretmen adaylarının erkek öğretmen adaylarına göre daha fazla eleştirel düşünme eğilimine sahip oldukları sonucuna ulaşılmıştır. Zayıf'ın (2008) "öğretmen adaylarının eleştirel düşünme eğilimleri" ve Küçük 'ün (2007) "aday öğretmenlerin eleştirel düşünme eğilimleri ile duygusal zekâ düzeyleri arasındaki ilişki" başlıklı çalışmaları da bu sonucu desteklemektedir. Aynı şekilde problem çözme becerilerinde de cinsiyete göre kadın öğretmenler lehine anlamlı bir fark olduğu bulgusu elde edilmiştir. Kazu ve Şentürk'ün (2010) "*Teacher Opinions Concerning Development of Critical Thinking Skills by the Primary Curriculum*" isimli çalışmalarında elde ettiği sonuçlar bu görüşü desteklemektedir.

Çalışmada alan/bölüm değişkeninin, öğretmen adaylarının eleştirel düşünme eğilimlerini etkilediği bulgusuna ulaşılmıştır. Alan değişkenine göre ortaya çıkan fark, güzel sanatlar ile diğer alanlar arasındadır. Farklılığın en yüksek olduğu bölüm temel eğitim iken en düşük olduğu bölüm güzel sanatlardır. Güzel sanatlar alanında öğrenim gören öğretmen

adayları, diğer bölümdekilere göre daha düşük düzeyde eleştirel düşünme eğilimine sahip olduklarını belirtmişlerdir. Güzel sanatlar alanında verilen dersler veya alanda uygulanan sınav sisteminin bu durumda etkili olduğu söylenebilir. Tümkaya, Aybek ve Aldağ (2009) ve Zayıf (2008) çalışmalarında öğrenim görülen alanın eleştirel düşünme eğilimini etkilediği sonucuna ulaşmıştır.

Çalışmada öğretmen adaylarının problem çözme becerileri sınıf değişkenine göre farklılık göstermezken, eleştirel düşünme eğiliminde sadece 2.sınıf ve 3. sınıflar arasında 2. sınıflar lehine sistematiklik boyutunda bir fark bulunmuştur. Altunçekiç, Yaman ve Koray (2005) ile Serin'in (2001) çalışmaları bu bulguyu desteklemektedir. Böyle bir sonuca ulaşılmaması, üniversitelerde verilen eğitimin öğretmen adaylarının eleştirel düşünme eğilimleri üzerinde olumlu bir etkisinin sınırlı olduğu şeklinde yorumlanabilir.

Eleştirel düşünme ve problem çözme eğiliminde akademik başarıya ilişkin anlamlı fark ortaya çıkmıştır. Öğretmen adaylarının akademik not ortalamalarının yüksek olması, onların eleştirel düşüncelerine ve problem çözme becerilerine katkı sağlamaktadır. Bu durum, eleştirel düşünme ve problem çözme becerilerinin öğretmen adaylarının akademik başarılarını etkilediği şeklinde yorumlanabilir.

Yapılan korelasyon analizi sonuçlarına bakıldığında, eleştirel düşünme eğilimleri ile problem çözme becerileri arasında anlamlı bir ilişki olduğu görülmektedir. Bu sonuç; Tümkaya, Aybek ve Aldağ'ın (2009) gerçekleştirdiği çalışmanın bulgularıyla paralellik göstermektedir. Anlamlı ilişkiyi göz önüne alarak eleştirel düşünebilmenin, karşılaşılan problemleri çözmeye olumlu katkı sağlayacağı söylenebilir.

İnsan, kalıtım ve çevrenin ortak ürünüdür. Çevresel faktörler; bireylerin düşünceleri, davranışları ve becerileri üzerinde belirleyici etkiye sahiptir. Bu bağlamda eleştirel düşünme becerisi; toplumun kültür yapısıyla, ailede yetiştirme tarzıyla ve okulda verilen eğitim sistemiyle yakından ilişkilidir ve bunlardan büyük ölçüde etkilenerek şekillenir. Özellikle ailede ve okulda, çocukları /gençleri; merak etme, sorgulama yapma, soru sorma, kişilere, kararlara ve eylemlere eleştirel yaklaşma, analitik ve sistematik hareket etme yönünde teşvik etmek, bu yöndeki davranışlarını güçlendirmek; toplumda eleştirel düşünme ikliminin yeşermesinde ve bu kültürün yerleşmesinde en önemli adımları oluşturacaktır. Bireylerde eleştirel düşünme eğilimi ve bunun önemli boyutları olan merak etme, açık fikirli olma, doğruyu sorgulayarak arama, kendine güvenme, analitik ve sistematik düşünme ve hareket etme becerilerinin gelişmesi; bireylerin karşılaştıkları problemleri çözme ve önlerine çıkan güçlüklerle baş etme becerilerinin de gelişmesine önemli katkılar sağlayacaktır. Bu nedenle eğitim sisteminde yer alan dersler önemle seçilmeli ve müfredatta yer verilen dersler tercih edilirken öğrencilerin düşüncelerine, analiz etmelerine yardımcı olacak dersler olmasına dikkat edilmelidir.

Anahtar Sözcükler: Eleştirel düşünme, Eleştirel düşünme eğilimi, Problem çözme

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