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Investigation of the relationship between prospective teachers' critical thinking dispositions and study approaches

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Abstract

The study was aimed to investigate not only the relationship between prospective teachers' study approaches and critical thinking dispositions, but also their study approaches and critical thinking dispositions in terms of various variables. In this research survey model was utilized. The participants were 242 prospective teachers at Alanya Alaaddin Keykubat University Faculty of Education. In order to collect data, the "Critical Thinking Disposition" revised by Semerci (2016) and the "Study Process" scales the validity and reliability of which were conducted by Yılmaz and Orhan (2011) were utilized. In the research, the descriptive statistics and Kruskal Wallis H test and independent samples t-test were used. Prospective teachers were found to score at "I agree" levels at the Critical Thinking Disposition Scale and "It is true of me about half the time" at the study approaches. There wasn't significant difference between prospective teachers' both study approaches and critical thinking dispositions in according to gender variable, but there was statistically significant difference in according to class level and program type variables. In addition to, meaningful relationship was found between deep study approach and critical thinking dispositions.

Keywords: Critical thinking dispositions, prospective teachers, study approaches

1. Introduction

Thinking is a mental activity that distinguishes individual from all other beings in nature. In the Turkish Language Society (2020), the term "thinking" is described as "examining, comparing information and generating thoughts, creating mental ability by using the relationship of information in order to reach a conclusion", and the term "criticism" is defined as "examining, testing, judgment, especially in the principles and accuracy condition of information." Critical thinking, which is a thinking skill (Akınoğlu, 2003), is the ability of the individual to bear responsibility for his or her own ideas and thoughts (Özdemir, 2005; Paul, Binker, Jensen & Kreklau, 1990). There are different of definitions related to critical thinking. For example: Ennis (2011: 1) as "critical thinking is reasonable and reflective thinking focused on deciding what to believe or do";

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Schafersman (1991: 3) as "correct thinking in the pursuit of relevant and reliable knowledge about the world", Duron, Limbach & Waugh (2006: 160) as “the ability to analyze and evaluate information” and Sünbül (2014: 233) defines as "investigating the truth through all the positive and negative, visible and invisible aspects and giving judgment on it". Based on this information, it can be said that there is a high-level of reasoning in critical thinking (Yüksel, Sarı & Uzun, 2013). The rules of critical thinking are explained by Demirel (2004: 227) as "(1) consistency, (2) combining, (3) applicability, (4) proficiency, (5) communication".

Having gain the ability to think critically should be included among the objectives of the education programs offered to individuals (Seferoğlu & Akbıyık, 2006). Thus, Paul (1984) focuses on the importance of developing the ability in individuals to think critically for the freedom of society (cited in Akınoğlu, 2003). Because, according to Lipman (1988), critical thinking is based on well-established and strengthen thinking. Moreover, individuals who do not think critically do not realize what they can bring into the society (Küçük, 2007). However, critically thinking individuals evaluate the opinions of their own and other individuals (Sünbül, 2014) and thus provide some benefits to the society in which they live. In addition, critically thinking individuals who can approach events objectively (Demir, 2011; Sünbül, 2014) question the causes of the situations and events they encounter, and try to solve the problems they face (Özdemir, 2005).

The ability to critical thinking can be learned (Çarkıt, 2019) and it is also teachable (Demirel, 2004). According to Lau (2013: 412), “as with the development of many skills, there are three factors in learning critical thinking: theory, practice, and bring it into behavior”. From childhood, individuals learn many things from their parents, peers or other people around them. However, peers and parents may not always be effective in teaching critical thinking, since this need educated individuals (Schafersman, 1991). Accordingly, teachers are one of the most influential people in making students gain the critical thinking skills (Özdemir, 2005). But that is significant for teachers to be trained in critical thinking in order to gain these skills (Demirel, 2004).

Both hereditary and environmental factors affect the critical thinking of the individual (Tümkaya & Aybek, 2008). According to Çalışkan (2019: 117) "it can be said that when some obstacles are overcome in the thinking process, critical thinking begins, these obstacles are our emotions, prejudices, tendencies, power of authority, traditions, habits, egocentrism and community-centrism, dogmatic thoughts." Onosko (1991: 3) explains the reasons six barriers develop of critical thinking in students as follows: “instruction as knowledge transmission, a curriculum of coverage, teacher perceptions of students, large number of students, lack of planning time, and a culture of teacher isolation”. Korkmaz (2009) mentioned that students' critical thinking skills can affect from different reasons such as education is theoretical, students are mostly passive in the learning process, and generally the use of multiple-choice tests as an assessment tool. Also, memorization,

exams and evaluation types can negatively affect students' the critical thinking skills (Özdemir, 2005).

Students' active participation in the teaching-learning process can affect their critical thinking (Duron, Limbach & Waugh, 2006; Korkmaz, 2009; Tiwari, Lai, So & Yuen, 2006). In relation to the subject Gürkaynak, Üstel & Gülgöz (2008: 20) mentions that strategies for improving critical thinking skills in general include; "collaborative work, discussion/case discussion, question preparation, challenging reading material, discussions through teacher's facilitation, producing questions, reasoning, justifying, writing assignments, dialogue studies and role playing/creative drama." Also, according to Berman (1991: 10) in order to development and teaching critical thinking these should be taken into consideration; "(1) preparing a safe environment, (2) exploiting what is known, (3) working with class members, (4) learning to ask good questions, (5) learning commitment to classmates, (6) gaining a multifaceted perspective, (7) creating sensitivity, (8) creating a perspective for the future and developing standards, (9) turning thoughts into behaviors" (cited in Semerci, 2003: 65). Also, according to Özden (2020) reading habit is effective in learning to think critically.

The study approaches are the second topic of this present research. Magno (2013) mentions that using suitable learning approaches for the improve of students' critical thinking skills.

With the onset of students' learning life, academically successful and unsuccessful concepts are included in their lives. The academic failures of individuals are perceived as a major problem (Akar, 2016). Şen (2006) connects these failures usually to the way students use their study approaches and their effective learning.

Everyone's goals of participating in the learning-teaching process are different. As a matter of fact, according to Biggs (1999), individuals can behave in two different ways when learning the subjects as deep and surface approach. While students studying with a deep approach try to learn the subject, students studying with a surface approach try to be successful or pass the course (Bahar & Okur, 2018). In an optimal system, whole of students are expected to participate in high-level learning activities (Biggs, Kember & Leung, 2001). But students may prefer different approaches according to the conditions and they act only according to the deep or surface approach when learning is carried out (Yılmaz & Orhan, 2011). However, Bahar & Okur (2018) emphasized the importance of directing students to their deep approach rather than surface approach for the quality of teaching.

Individual can acquire his/her own study habits both by himself/herself and through different external means (Akyıldız Sarıbaş & Akay, 2017). In this regard, the teachers whom the students play take as their role models have great duties. For example, in active teaching-learning processes, students use deep learning approach more while in

passive teaching-learning processes it can be said that students use more surface learning approach (Akar, 2016).

Critically minded individuals can be research, reason, do not accept ideas as they are, question them and create their own ideas (Sünbül, 2014). In addition, it can be said that individuals actively learn the subject in the deep learning approach, while individuals learn passively and use memorization in the surface learning approach (Akar, 2016). Magno (2013: 24) mentioned that "the strategies used in deep and surface learning indicate ways in which students relate to the learning material while the outcome can critical thinking". Based on these, it can be said that the teaching-learning processes created by teachers are effective both in the use of study approaches and in the formation and improving of critical thinking, therefore teachers have important roles in improving both the study approaches and critical thinking. Thus, study approaches of prospective teacher and critical thinking disposition are importance both for their own lives and for the students they will train in the future. Because of these reasons, determining both critical thinking dispositions and study approaches of teacher candidates and determining how they mutually affect each other is an important issue.

When the literature is examined, some studies were found which focused on the teacher candidates' critical thinking dispositions (Alper, 2010; Ateş & Yavuz, 2018; Can & Kaymakçı, 2015; Coşkun, 2013; Durukan & Maden, 2010; Kartal, 2012; Tabak, 2011; Yıldırım & Şensoy, 2017, Yüksel, Sarı Uzun and Dost, 2013; Zayif, 2008); also, relationships between different subjects with teacher candidates' critical thinking dispositions were examined in literature. These are respectively: learning styles (Açışlı, 2016); questioning skills (Arseven, Dervişoğlu & Arseven, 2015); media and television literacy (Aybek, 2016); their educational beliefs or educational philosophies (Aybek & Aslan, 2017; Alkın Şahin, Tunca & Ulubey, 2014; Hayırsever & Oğuz, 2017); their empathetic (Ekinci, 2009); reflective thinking levels (Evin Gencel & Güzel Candan, 2014); problem solving skills and academic achievement levels (Gürleyük, 2008); attitudes towards reading habit (Susar Kırmızı, Fenli & Kasap, 2014). In addition, regarding study approaches; study approaches of teacher candidates (Aksu & Kurtuldu, 2015; Akyıldız Sarıbaş & Akay, 2017; Altun, 2013; Kurtuldu, 2013; Yağcı, 2015); the predictive power of studying approaches on academic success (Bahar & Okur, 2018); study approaches based on learning styles (Okur, Bahar & Sülün, 2019) were found in the literature. Also, relationships between different subjects with teacher candidates' study approaches were examined in literature. These are; academic self-efficacy perceptions (Çuhadır, Gündüz & Tanyeri, 2013), general procrastination tendencies (Akar, 2016) and academic expectations (Yıldız, 2015). Apart from these, Magno (2013) studied the relationship between critical thinking and approaches to learning among senior high school students.

1.1. Research questions

In the study, it was aimed to determine the relationship between critical thinking dispositions of teacher candidates and their study approaches. The research sought answers to the following research questions, respectively:

- What is the level of teacher candidates' critical thinking dispositions?
- What are the teacher candidates' study approaches?
- Do teacher candidates' critical thinking dispositions and study approaches differ as statistically significantly based on gender, class level and program type variables?
- Is there a meaningful relationship between teacher candidates' study approaches and critical thinking dispositions?

2. Method

2.1. Research Model

In the present research, survey model within quantitative research was utilized. "Studies aimed at collecting data to determine certain characteristics of a group are called survey studies" (Büyüköztürk, etc. 2008: 15). Also, "surveys are one of the tools used to standardize observations in social sciences" (Balcı, 2007: 140).

2.2. Study Group of Research

The participants in this present research composed of 242 teacher candidates at Alanya Alaaddin Keykubat University in the 2019-2020 academic year. The participants of the research were selected randomly on voluntary basis.

Table 1. Descriptive statistics belonging to the teacher candidates in the study group of research

Variable		N	%
Gender	Female	163	67.4
	Male	79	32.6
Program Type	Elementary Mathematics Teaching	101	41.7
	Science Teaching	25	10.3
	English Language Teaching	51	21.1
	Preschool Teaching	37	15.3
	Guidance and Psychological Counseling	28	11.6
Class Level	1st Grade	79	32.6
	2nd Grade	121	50.0
	3rd Grade	29	12.0
	4th Grade	13	5.4

2.3. Data Collection Tools

In the research, the "Critical Thinking Disposition Scale" revised by Semerci (2016) and the "Study Process" scales the validity and reliability of which were conducted by Yılmaz & Orhan (2011) were utilized in order to collect data. Firstly, Semerci (2000) developed the Critical Thinking Scale which consists of 55 items. The one-dimensionality of the scale was considered as limitation, its name was revised to think critically disposition scale and validity and reliability analysis investigations were conducted by Semerci (2016). The scale is a total of 49 items and explains 49.161% of the total variance. Semerci (2016) conducted a validity-reliability analysis study on the scale. This scale ranges are rated from “Totally agree” to “Totally Disagree" (Semerci, 2016). A reliability analysis with 260 teacher candidates was conducted before the scale was utilized in the present research. This scale’ corrected item-total correlations varied between 0.320-0.655. Internal Consistency Coefficients for the scale are located in the table below.

Table 2. Internal Consistency Coefficients for Critical Thinking Disposition

Dimensions	Item Number	Cronbach's Alpha (Semerci, 2016)	Cronbach's Alpha (Present research) (N=260)
Metacognition	14	0.899	0.828
Flexibility	11	0.892	0.824
Systematicity	13	0.903	0.853
Perseverance and patience	8	0.836	0.818
Open-mindedness	3	0.672	0.616
General critical thinking dispositions	49	0.963	0.946

Biggs (1987) developed Study Process Questionnaire, consists of three dimensions with 43 items as deep, surface and achieving. Then, 2-factor and 20-item scale was obtained (Biggs, etc., 2001). Yılmaz & Orhan (2011) conducted a validity-reliability analysis study on the scale. There are 10 items in each dimension, and 41.635% of the total variance. Study approach ranges are rated from “this item is never or only rarely true of me” to “this item is always or almost always true of me". Before the scale was utilized in the present research, a reliability analysis with 249 teacher candidates was conducted. The corrected item-total correlations of the deep approach consisting of 10 items varied between 0.320-0.655 and 0.346-0.520 for the surface approach consisting of 10 items. Internal Consistency Coefficients are located in Table 3 below.

Table 3. Internal Consistency Coefficients for Study Approach

		Cronbach's Alpha		
Dimensions	Item Number	(Yılmaz & Orhan)	(Biggs, Kember & Leung, 2001)	Present research (N=249)

Deep approach	10	0.79	0.73	0.82
Surface approach	10	0.73	0.64	0.78

2.4. Data Processing and Analysis

In the research, the descriptive statistics based on the responses of the teacher candidates were calculated and their participation levels in the scales were determined. To find out if the prospective teachers' study approaches and critical thinking dispositions varied significantly according to variables, the mean scores and standard deviations for the sub-dimensions of both scales were calculated. Normality distribution was checked by using skewness and kurtosis, mode, median and mean scores. According to these measurements; independent samples t-test was applied for the "gender" variable, and Kruskal Wallis H test was applied for "class level" and "program" variables. For the purpose of assess the difference between the groups, multiple comparisons were made Mann Whitney U test and using Bonferroni adjustment. Pearson Product Moment Correlation analysis was used to determined analyze the relationships between teacher candidates' critical thinking dispositions and their study approaches.

3. Findings

In this part of the research, findings for the research problem and sub-problems of the research are presented.

3.1. The descriptive statistics regarding the teacher candidates' study approaches and their critical thinking dispositions in the research

Descriptive statistics regarding the teacher candidates' study approaches and critical thinking dispositions in the research are given in Table 4.

Table 4. Descriptive statistics regarding study approaches and critical thinking dispositions of teacher candidates (N=242)

Sub-dimension	Number of items	Min-Max	Mean	SS	Participation Level
Metacognition	14	37.00-70.00	57.3636	6.59938	"I agree"
Flexibility	11	27.00-55.00	44.8512	5.53774	"I agree"
Systematicity	13	30.00-65.00	52.0661	6.87860	"I agree"
Perseverance and patience	8	15.00-40.00	31.9174	4.71087	"I agree"
Open-mindedness	3	7.00-15.00	12.1405	1.74900	"I agree"
General critical thinking dispositions	49	142.00-245.00	198.3388	21.91763	"I agree"
Deep study approach	10	14.00-50.00	33.4835	6.75488	"It is true of me about half the time"
Surface study approach	10	13.00-50.00	27.6405	7.87868	"It is true of me about half the time"

When the responses in the critical thinking disposition scale are considered in accordance with the sub-dimensions (average/number of items); metacognition ($\bar{x}$ =4.10), flexibility ($\bar{x}$ =4.08), systematicity ($\bar{x}$ =4.00), perseverance and patience ($\bar{x}$ =3.99), open-mindedness ($\bar{x}$ =4.05) and overall scale ($\bar{x}$=4.05) were found to score at "I agree" levels.

When the participations of teacher candidates on study approaches was analyzed on a sub-dimension basis, it was seen that the surface ($\bar{x}$ =2.76) and deep ($\bar{x}$ =3.35) study approach dimensions were chosen at the level "It is true of me about half the time" in the scale.

In addition, Yılmaz and Orhan (2011) mentioned that the study approaches of the students were determined by looking at whether they scored higher in the deep or surface approaches. As seen in Table 5, analysis results for these were determined that 166 prospective teachers had a deep study approach and 76 prospective teachers had a surface study approach.

Table 5. Study Approaches of Teacher Candidates by Variables

		Deep study approach		Surface study approach		Total	
	Variable	N	%	N	%	N	%
Gender	Female	116	47.9	47	19.4	163	67.4
	Male	50	20.7	29	12.0	79	32.6
	Total	166	68.6	76	31.4	242	100
Class Level	1st Grade	53	21.9	26	10.7	79	32.6
	2nd Grade	89	36.8	32	13.2	121	50
	3rd Grade	15	6.2	14	5.8	29	12
	4th Grade	9	3.7	4	1.7	13	5.4
	Total	166	68.6	76	31.4	242	100
Program Type	Elementary Mathematics Teaching	64	26.4	37	15.3	101	41.7
	Science Teaching	17	7	8	3.3	25	10.3
	English Language Teaching	37	15.3	14	5.8	51	21.1
	Preschool Teaching	27	11.2	10	4.1	37	15.3
	Guidance and Psychological Counseling	21	8.7	7	2.9	28	11.6
	Total	166	68.6	76	31.4	242	100

3.2. The findings regarding whether teacher candidates' critical thinking dispositions and their study approach differ significantly according to gender, class level and program type variables

The independent samples t-test result of analysis the teacher candidates' critical thinking dispositions and study approaches according to gender are given in Table 6 below.

Table 6. Analysis of study approaches and critical thinking dispositions by gender variable (N=242)

Subdimensions	Gender	N	Mean	SS	SD	t	p
Metacognition	Female	163	57.6687	6.68244	240	1.033	0.30
	Male	79	56.7342	6.42054			
Flexibility	Female	163	45.1963	5.60518	240	1.395	0.16
	Male	79	44.1392	5.36067			
Systematicity	Female	163	52.1166	6.55122	240	0.164	0.87
	Male	79	51.9620	7.55228			
Perseverance and patience	Female	163	32.1043	4.66483	240	0.886	0.38
	Male	79	31.5316	4.81141			
Open-mindedness	Female	163	12.1166	1.68652	240	0.305	0.76
	Male	79	12.1899	1.88160			
General critical thinking dispositions	Female	163	199.2025	21.61080	240	0.880	0.38
	Male	79	196.5570	22.57225			
Study approaches (Deep)	Female	163	33.9939	6.58327	240	1.695	0.09
	Male	79	32.4304	7.02137			
Study approaches (Surface)	Female	163	27.3436	7.39484	240	0.842	0.40
	Male	79	28.2532	8.81210			

p*<.05

Between female and male teacher candidates' the average scores received in the critical thinking dispositions scale showed no significant difference [$t(240)_{Metacognition}$=1.033, p>0.05; $t(240)_{Flexibility}$=1.395, p>0.05; $t(240)_{Systematicity}$=0.164, p>0.05; $t(240)_{Perseverance\ and\ Patience}$=0.886, p>0.05; $t(240)_{Open\ Mindedness}$=0.305, p>0.05; $t(240)_{General\ Critical\ Thinking\ Dispositions}$=0.880, p>0.05].

At the same time, between female and male teacher candidates' the average scores received in the both deep and surface approach showed no significant difference [$t(240)_{Deep\ Approach}$=1.695, p>0.05; ($t(240)_{Surface\ Approach}$ =0.842, p>0.05). As a result, it can be said that gender variable does not have a statistically significant effect teacher candidate's both on critical thinking dispositions and on the deep and surface study approaches.

The findings regarding whether the teacher candidate's critical thinking dispositions and study approaches differ in terms of class level are given in Table 7 below.

Table 7. Kruskal Wallis H test analysis results of critical thinking dispositions and study approaches scores of teacher candidates by class level (N=242)

Sub-dimension	Class Level	N	Mean Rank	Chi-Square	Degree of Freedom	Level of Significance (p)	Meaningful Difference
Metacognition	1st	79	117.47	5.808	3	0.121	
	2nd	121	129.16				
	3rd	29	96.09				
	4th	13	131.38				
	Total	242					
Flexibility	1st	79	126.04	7.781	3	0.051	
	2nd	121	124.74				
	3rd	29	88.41				
	4th	13	137.50				
	Total	242					
Systematicity	1st	79	124.15	6.471	3	0.091	
	2nd	121	124.79				
	3rd	29	92.09				
	4th	13	140.46				
	Total	242					
Perseverance and patience	1st	79	116.20	6.515	3	0.089	
	2nd	121	128.11				
	3rd	29	97.53				
	4th	13	145.65				
	Total	242					
Open-mindedness	1st	79	118.20	3.992	3	0.262	
	2nd	121	126.68				
	3rd	29	101.64				
	4th	13	137.62				
	Total	242					
General critical thinking dispositions	1st	79	120.51	8.438	3	0.038*	2>3 (U=1179.50, z=2.737)
	2nd	121	128.19				
	3rd	29	88.38				
	4th	13	139.12				
	Total	242					
Deep study approach	1st	79	111.91	8.263	3	0.041*	2>3 (U=1217.50, z=2.559)
	2nd	121	133.05				
	3rd	29	97.47				
	4th	13	125.92				
	Total	242					
Surface study approach	1st	79	121.28	3.121	3	0.373	
	2nd	121	117.76				
	3rd	29	142.10				
	4th	13	111.65				
	Total	242					

p*<.05

As can be seen in Table 7, based on the scores of metacognition, flexibility, systematicity, perseverance and patience and open-mindedness weren't statistically significant difference in terms of the class levels in which they studied ($X^2_{\text{metacognition}}$ =5.808, SD=3, p>.05; $X^2_{\text{flexibility}}$ =7.781, SD=3, p>.05; $X^2_{\text{systematicity}}$ =6.471, SD=3, p>.05; $X^2_{\text{perseverance and patience}}$=6.515, SD=3, p>.05; $X^2_{\text{open-mindedness}}$ =3.992, SD=3, p>.05). However,

"general critical thinking dispositions" scores (X^2=8.438, SD=3, p<.05) showed a significant difference based on the class level variable. Multiple comparisons have been made to determine in which between class levels the differences came out. As a result of the comparisons, it was determined that this difference in general critical thinking dispositions was in favor of teacher candidates studying in 2nd grade (Median=200) compared to the 3rd grades (Median=189) (U (2-3) = 1179.50, z=2.737).

Also, "deep study approach" scores (X^2=8.263, SD=3, p<.05) showed a statistically significant difference taking the class level variable into account. As a result of the multiple comparisons which applied, it was determined that this difference in deep study approach was in favor of teacher candidates studying in 2nd grade (Median=34) compared to the 3rd grades (Median=31) (U (2-3) = 1217.50, z=2.559). But "surface study approach" group scores (X^2=3.121, SD=3, p>.05) showed no a statistically significant difference taking the class level variable into account. Based on this information, it can be said that the class level variable has no significant effect on the surface study approach.

The findings regarding whether the teacher candidate's critical thinking dispositions and study approaches differ in terms of program type are given in Table 8.

Table 8: Kruskal Wallis H test analysis results of critical thinking dispositions and study approach scores of teacher candidates by program type variable (N=242)

Sub-dimension	Program Type	N	Mean Rank	Chi-square	Degree of Freedom	Level of Significance (p)	Meaningful Difference
Metacognition	1	101	107.75	17.247	4	0.002*	1< 4 (U=991.50, z=4.222) 3< 4 (U=637.00, z=2.598) 5< 4 (U=311.00, z=2.751)
	2	25	119.66				
	3	51	123.64				
	4	37	162.88				
	5	28	114.16				
	Total	242					
Flexibility	1	101	105.69	13.208	4	0.010*	1< 4 (U=1213.00, z=3.157)
	2	25	138.86				
	3	51	128.25				
	4	37	148.99				
	5	28	114.39				
	Total	242					
Systematicity	1	101	106.76	9.684	4	0.046*	1< 4 (U=1300.00, z=2.737)
	2	25	126.28				
	3	51	131.11				
	4	37	144.80				
	5	28	122.13				
	Total	242					
Perseverance and patience	1	101	112.75	7.260	4	0.123	
	2	25	123.18				
	3	51	115.06				
	4	37	146.65				
	5	28	130.07				
	Total	242					
Open-mindedness	1	101	112.07	9.901	4	0.042*	1< 4 (U=1320.50, z=2.681)
	2	25	122.84				
	3	51	130.98				
	4	37	147.01				
	5	28	103.32				
	Total	242					
General critical thinking dispositions	1	101	106.78	13.578	4	0.009*	1< 4 (U=1104.50, z=3.673)
	2	25	124.58				
	3	51	126.21				
	4	37	155.58				
	5	28	118.23				
	Total	242					
Deep study approach	1	101	105.33	14.151	4	0.007*	1< 4 (U=1159.50, z=3.412)
	2	25	136.92				
	3	51	117.93				
	4	37	150.91				
	5	28	133.71				
	Total	242					
Surface study approach	1	101	126.63	9.314	4	0.054	
	2	25	128.20				
	3	51	109.43				
	4	37	140.39				
	5	28	94.02				
	Total	242					

p*<0.05 (1=Elementary Mathematics Teaching, 2=Science Teaching, 3= English Language Teaching, 4= Preschool Teaching, 5= Guidance and Psychological Counseling)

Based on the analysis results of this test, no statistically significant difference was found in the scores of the "perseverance and patience" sub-dimension (X^2 = 7.260, SD = 4, p> .05) in according to program type variable.

According to the findings of this test; based on the scores of "metacognition" (X^2=17.247, SD=4, p<.05), "flexibility" (X^2=13.208, SD=4, p<.05), "systematicity" (X^2=9.684, SD=4, p<.05), "open-mindedness" (X^2=9.901, SD=4, p<.05) and "general critical thinking dispositions" (X^2=13.578, SD=4, p<.05), it was found a statistically significant difference by program type. Multiple comparisons have been made to determine in which between program type the differences came out. As a result of the comparisons, regarding the “metacognition” sub-dimension, this meaningful difference was in favor of preschool teacher candidates (U(4-1)= 991.50, z=4.222; U(4-3)= 637.00, z=2.598; U(4-5)= 311.00, z=2.751) when the teacher candidates studying in preschool teaching program (Median=62) were compared to the ones studying in Elementary Mathematics Teaching program (Median=56), in English language teaching program (Median=56), and in Guidance and Psychological Counseling program (Median=56). In addition, the difference in sub-dimensions of "flexibility", "systematicity” and "open-mindedness" and in "general critical thinking dispositions" was in favor of teacher candidates studying in preschool education [Median(Flexibility)=47; Median(Systematicity)=55; Median(Open Mindedness)=13; Median (General critical thinking dispositions)=206) compared to teacher candidates in Elementary Mathematics program [Median(Flexibility)=44; Median(Systematicity)=51; Median(Open Mindedness)=12; Median (General Critical thinking dispositions)=194), (U[Flexibility (Preschool-Elementary Mathematics)]= 1213.00, z=3.157; U[Systematicity (Preschool-Elementary Mathematics)]= 1300.00, z=2.737; U[Open-Mindedness (Preschool-Elementary Mathematics)]= 1320.50, z=2.681); U[General critical thinking dispositions (Preschool-Elementary Mathematics)]= 1104.50, z=3.673).

Also, "deep study approach" scores (X^2=14.151, SD=4, p<.05) of teacher candidates showed a statistically significant difference in according to program type variable. As a result of the comparisons, it was determined that this difference in the deep study approach sub-dimension was between Preschool prospective teachers (Median=36) and Elementary Mathematics (Median=32) prospective teachers, and was in favor of Preschool teacher candidates (U (Preschool-Elementary Mathematics) = 1159.50, z=3.412). On the other hand, "surface study approach" sub-dimension scores (X^2=9.314, SD=4, p>.05) showed no a statistically significant difference taking the program type variable into account.

3.3. The findings regarding the relational between the critical thinking dispositions and study approaches are located in the table below.

Table 9. Analysis results of Pearson Moments correlation (N=242)

		Critical thinking dispositions					
Study Approaches	Sub-dimensions	Metacognition	Flexibility	Systematicity	Perseverance and patience	Open-mindedness	General critical thinking dispositions
	Deep study approach	0.468**	0.478**	0.457**	0.537**	0.439**	0.555*
	Surface study approach	-0.010	-0.021	-0.112	-0.111	-0.088	-0.074

*<0.01

For purpose of find out if a relationship existed between critical thinking dispositions of teacher candidates and their study approaches in the research, simple correlation analysis was utilized. As a result, it was found that there was a positive and significant relationship between the "deep study approach" and "critical thinking dispositions" ($r_{(Metacognition)}$ =. 468, r^2 =.22, p<.01; $r_{(Flexibility)}$ =. 478, r^2 =.23, p<.01; $r_{(Systematicity)}$ =. 457, r^2 =.21, p<.01; $r_{(Perseverance\ and\ patience)}$ =. 537, r^2 =.29, p<.01; $r_{(Open\text{-}mindedness)}$ =. 439, r^2 =.19, p<.01; $r_{(General\ critical\ thinking\ dispositions)}$ =. 555, r^2 =.31, p<.01). Büyüköztürk (2014: 32) mentions that "the correlation coefficient as an absolute value shows a low relationship between 0.00-0.30 and a moderate between 0.30-0.70 and high between 0.70-1.00". Based on this information, it can be said that there is a positive, moderate and meaningful relationship between deep study approach and general critical thinking dispositions. But there is a positive, low and meaningful relationship between deep study approach and sub-dimensions of critical thinking dispositions scale. However, in the research there wasn't statistically significant relationship between "surface study approach" and "critical thinking dispositions"

4. Discussion, Conclusion, and Suggestions

When the participations of the teacher candidates to the Critical Thinking Disposition Scale together with its sub-dimensions were evaluated, it was determined that they mostly responded on each of the sub-dimensions and on the overall scale (general critical thinking dispositions) at "I agree" level. In connection with this result of the research, in the literature, there are studies which found that teacher candidates scored at "I agree" level regarding the critical thinking tendency (Aybek & Aslan, 2017), their critical

thinking disposition were in "good" level (Evin Gencel & Güzel Candan, 2014), they had critical thinking disposition above the average level (Durukan & Maden, 2010).

When the study approaches respond of the teacher candidates are considered, it is found that their surface and deep approaches were rated at the level of "it is true of me about half the time". However, the scores of teacher candidates with deep study approach ($\bar{x}$ =3.35) were higher than those of teacher candidates with surface study approach ($\bar{x}$ =2.77). In the literature there are different research similar to this finding which were conducted on vocational high school students (Olpak & Korucu, 2014) and teacher candidates (Akar, 2016; Aksu & Kurtuldu, 2015; Akyıldız Sarıbaş & Akay, 2017; Çuhadır, Gündüz & Tanyeri, 2013; Okur, Bahar & Sülün, 2019; Özgür & Tosun, 2012; Yağcı, 2015; Yıldız, 2015).

Throughout this research, taking the gender variable into account, significant difference wasn't determined with the critical thinking dispositions of the teacher candidates, both in all sub-dimensions of the scale and on the overall scale. Parallel with this result, there are different researches (Coşkun, 2013; Ekinci, 2009; Tabak, 2011; Yıldırım & Şensoy, 2017 and Yüksel, Sarı Uzun & Dost, 2013). However, study conducted by Kartal (2012) found that critical thinking total scores were in favor of male participants, while studies conducted by Ateş & Yavuz (2018) and Zayif (2008) found that they were in favor of female participants.

In the research, there wasn't statistically significant difference by gender between the study approaches of the teacher candidates. Parallel with this result, there are different studies in the literature which conducted on Vocational High School students (Olpak & Korucu, 2014) and on teacher candidates (Bahar & Okur, 2018; Kurtuldu, 2013). However, in some studies which had partially similar findings with this current research, it was found no difference in the deep approach by gender, but a difference in surface approach in favor of male participants (Çuhadır, Gündüz & Tanyeri, 2013; Özgür & Tosun, 2012; Yağcı, 2015; Yıldız, 2015). In addition, in the study conducted by Akyıldız Sarıbaş & Akay (2017), the average scores of males in surface approach were higher than the average scores of females while the average scores of females in deep approach were higher than the male.

In the research, between critical thinking dispositions of teacher candidates based on the class level variable, statistically significant difference was found only in the overall scale. As a result of the comparisons conducted by researcher, it was found that this difference was in favor of the teacher candidates who studied in the 2nd grades compared to the 3rd grades. In connection with this result, in a research applied by Durukan & Maden (2010), it was found that teacher candidates in grades 1 and 3 tended to think more critically than students in grades 2 and 4, while the study by Zayif (2008) found that those in the third grade tended to think more critically than the ones in the first grade. While there are studies where critical thinking dispositions were found to increase as the class level increased (Kartal, 2012), there are also studies in the literature which

found no significant difference in term of the class level (Ateş & Yavuz, 2018; Ekinci, 2009; Yıldırım & Şensoy, 2017 and Yüksel, Sarı Uzun & Dost, 2013).

Based on class level of the teacher candidates, there was statistically significant difference only in deep study approach of study approaches. As a result of the comparisons conducted by researcher, it was found that this difference was between in the 2nd and 3rd grades, and this difference in favor of the teacher candidates who studied in the 2nd grade. This result of the research is overlaps with the findings of research carried by Çuhadır, Gündüz & Tanyeri (2013), since in this research, they found 1st graders teacher candidates used a deep study approach more than 4th graders even if a little. However, in studies conducted with the participation of both teacher candidates (Akyıldız Sarıbaş & Akay, 2017; Özgür & Tosun, 2012; Yağcı, 2015), and vocational high school students (Olpak & Korucu, 2014), it was found that there was no significant difference according to class levels. In addition, in the study conducted by Aksu & Kurtuldu (2015), they found that there was a tendency towards third graders in the surface study approach, and first graders in the deep study approach.

Between the critical thinking dispositions in according to program type variable of the teacher candidates, while there was no statistically significant difference only "perseverance and patience" sub-dimension. As a result of the comparisons conducted by researcher, a significant difference in the metacognition sub-dimension was found in favor of Preschool teacher candidates compared to teacher candidates who studied in Elementary Mathematics, English Language teaching and Guidance and Psychological Counseling program respectively. In addition, it was determined that the difference in the "flexibility", "systematicity", "open-mindedness" sub-dimensions and "general critical thinking dispositions" was found to be between the teacher candidates from Preschool teaching program and Elementary Mathematics program, in favor of Preschool teacher candidates. In connection with this result of the research, in the literature there are studies in which there were significant differences based on the program studied (Alkın Şahin, Tunca & Ulubey, 2014; Aybek & Aslan, 2017; Zayif, 2008), as well as no significant differences according to the type of program studied (Can & Kaymakçı, 2015; Ekinci, 2009).

Based on the program types of the teacher candidates, significant difference was found only in deep study approach. As a result of the comparisons conducted by researcher, it was found that this difference was between teacher candidates who studied in the Preschool teaching and Elementary Mathematics teaching programs, and this difference was in favor of the Preschool teacher candidates. In connection with this result of the research, the study conducted by Bahar & Okur (2018) found a difference in the deep study approach according to program types, while there was no difference in surface study approach. In addition, Akyıldız Sarıbaş & Akay's (2017) study found a significant difference in both study approach.

Simple correlation analysis was utilized in order to examine the relationship between prospective teachers' study approaches and critical thinking dispositions. The results showed meaningful relationship between deep study approach and critical thinking dispositions. However, there wasn't statistically significant relationship between surface study approaches and critical thinking dispositions. In connection with this result of the study, Magno (2013) examined the relationship between critical thinking and approaches to learning with senior high school students and found that both surface and deep approaches increased the variance in explaining the critical thinking.

Learning-teaching environments should be arranged to improve prospective teachers' both critical thinking disposition and deep study approach, and should be preferred strategies, methods, and techniques, materials, etc. accordingly. Instructors should help prospective teachers gain both critical thinking skills and deep study approach by preparing learning-teaching processes which support environments where prospective teachers can easily express themselves, be active, easily ask questions and see things from different directions and enlarge their envisions. Instructors' assessment and examination styles should encourage students to think, not memorizing.

Similar studies can be conducted with prospective teachers at different universities. The results of these studies can be compared.

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