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Identification of Critical Thinking Dispositions of Teacher Candidates

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ABSTRACT Current study aims to identify critical thinking disposition of teacher candidates and investigate critical thinking disposition in terms of different variables. The study was undertaken with a total of 220 teachers from Classroom Teaching, Science Teaching, Primary School Mathematics Teaching and Computer Education and Instructional Technology (CEIT) Departments of Faculty of Education. "The California Critical Thinking Disposition Inventory (CCTDI)" adapted to Turkish was utilized in the study to find out critical thinking dispositions. Frequencies, percentages, arithmetic means, ANOVA and t-tests were used in data analysis. Critical thinking disposition of teacher candidates was found to be positive based on the findings obtained in the study. Differences were observed in critical thinking disposition depending on gender, class levels and departments of teacher candidates. No differences were identified based on father's occupation, location of family home and the type of high school graduation.

INTRODUCTION

It is imperative for education to equip individuals with thinking skills that are necessary to be successful in the chaos of the 21st century in which rapid changes and innovations are observed. According to Yagci (2008), individuals in knowledge society "generate realistic solutions to the problems, are open to new ideas, know that it is necessary to see events and individuals from different perspectives, respect the ideas of others, share and are at peace with inner self as well as with the society". Sahinel (2002) emphasizes that the skill of thinking is not sufficient by itself and critical thinking is required. Critical thinking is the most developed and advanced form of thinking. Skills such as critical thinking, questioning, problem solving and research in the renewed teaching programs are important skills that need to be acquired along the way to become knowledge society. Critical thinking is the competency to question, generate solutions, evaluate and make decisions that lead to results in terms of understanding life or for any reason (Paul and Elder 2002; McBride et al. 2002; Schwager and Labate 1993).

There are various definitions of critical thinking in literature. According to Lipman (1991) critical thinking is logical, creative and careful thinking and according to Paul and Elder (2002), it is systematically directed thinking which serves as a model for a thinking style or field. Ennis (1989) defines critical thinking as rational and reflective thinking skills that are used while making decisions about what to do and what to believe in. Ennis also states that skills such as explaining ideas, assessing the correctness of information and problem solving are required to ensure critical thinking. Cuceloglu (1997) defines critical thinking as "an active and organized cognitive process that aims to comprehend self and the events that surround us through awareness of individual thinking processes, by paying attention to the thinking processes of others and by implementing what we know". Critical thinking is a competency that relieves the individual

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from confusion created by unrelated information; that provides the generation of new information and that helps the individual during difficult decision making processes (Elder and Paul 2002; Emir 2013). Critical thinking is entertaining the possibility of the existence of alternative data and information instead of accepting the absoluteness of data by examining the knowledge in an interpretive and inquisitive manner (Walker 2005).

Equipping individuals with critical thinking skills, that is, critical thinking education is as important as the critical thinking skills. Systems and aims of education change as many other things in the knowledge society (Gadzella and Penland 1994; Yarker and Park 2012). In order to improve their education systems many countries have made innovations such as providing modern educational institutions, modern classrooms and schools and training teachers with high level of professional expertise and skills (Watson and Glaser 1994). Fundamental aims of education in the knowledge society includes transferring the necessary amount of knowledge to the individual and teaching how to access knowledge instead of direct transfer of knowledge and providing information in totality (Calik and Sezgin 2005). In this context, many universities define critical thinking as an important component of professional education and critical thinking is accepted as a crucial element in student training in professional sense (Ocansey et al. 1992). According to the report published by Association of American Colleges and Universities (AAC and U) in 2004, many higher education institutions have agreed on the basic skills student should acquire during their training in university regardless of the departments they attend to. Association of American Colleges and Universities focus on critical thinking skills the most among the 6 important skills identified at the end of the study (OOA 2006). Today's "knowledge society" in which technological chaos and abundance of information has increased requires university graduates who can effectively use information and critically analyze quality information, content of resource in addition to having knowledge and information. Majority of universities aim to train students who can think critically, make correct and effective decisions, present meaningful justifications, use sufficient evidence and express views comfortably (Hamers and Overtoom 1999; Frangoudaki 2004; Ahmad Assaf 2009; Jakob 2012; Batur 2013).

In order to train individuals with critical thinking skills, courses taken during university education should be reconstructed in terms of content and they should be composed of problem solving and critical thinking implementations regarding the specific discipline so that individuals with abstraction and reasoning skills, with skills to think systematically and to measure and compare and with high communication and cooperation skills can be trained (Facione 1998). Many studies were undertaken to identify critical thinking dispositions of teacher candidates both in international literature (Reed and Kromrey 2001; Stephen 2000; Young and Haris 2000; Ozgelen 2012) and national literature (Genc 2008; Kokdemir 2003; Turnuklu and Yesildere 2005; Cubukcu 2006; Uzuntiryaki and Capa 2013). These studies show that critical thinking dispositions of teacher candidates are not at the desired level. Low levels of critical thinking dispositions in teacher candidates give rise to thoughts that the socio-economic conditions and the family environments they are in and the education they are provided with at primary and secondary levels do not have the quality that can develop critical thinking dispositions. Cheung et al.'s (2001) and Kaya's (1997) studies highlighted the relationship between socio-economic status and critical thinking. Kurum's (2002) study also identified the education obtained prior to university as an important factor in the development of critical thinking skills. Literature also includes studies that investigated the methods to develop critical thinking skills of teacher candidates. For instance, Yeh (2004) identified computer assisted teaching and Tiwari et al. (2006) identified problem based learning as effective elements to improve critical thinking skills of teacher candidates. It is possible to find studies regarding the development of critical thinking skills of teacher candidates in national literature as well although the amount of studies is not as high as the studies that can be found in international literature (Eldeklioglu and Ozkilic 2008; Ozcinar 1996; Semerci 2003). Common result obtained from these studies points that teaching methods in which students are active contribute to the development of critical thinking skills (Herman 2002; Koc 2007).

Teaching model used to train the individuals in the science society should be a model that encourages students to think critically and that provides the students with skills such as sci-

entific thinking, problem solving, questioning and research. The most important responsibility to present and teach these skills to students in educational institutions falls on the teachers. Teachers should guide students to obtain critical thinking and problem solving skills and to obtain information (Allison 1993). In order for teachers to guide students in this respect and to teach these skills to students, they need to be equipped with critical thinking, questioning and interpretation skills themselves (Walker and Finney 1999). Therefore, the main purpose of the current study is to identify critical thinking skill levels of teacher candidates, to investigate these levels in terms of various variables and to provide suggestions that can contribute to education as a result of the findings obtained at the end of the study. Sub problem statements of the study are as follows:

Sub-problems of the Study

- What is the arithmetic mean of critical thinking dispositions of teacher candidates?
- Does critical thinking disposition of teacher candidates change according to gender?
- Does critical thinking disposition of teacher candidates change according to type of high school graduation?
- Does critical thinking disposition of teacher candidates change according to class levels?
- Does critical thinking disposition of teacher candidates change according to father's occupation?
- Does critical thinking disposition of teacher candidates change according to location of the family home?
- Does critical thinking disposition of teacher candidates change according to the department they are enrolled in?

MATERIAL AND METHODS

Research Model

The study undertaken to identify critical thinking dispositions of teacher candidates and the dimensions of the disposition is a descriptive field study based on survey model.

Working Group

Working group of the study was composed of Computer Education and Instructional Technology, Primary School Mathematics Teaching, Classroom Teaching and Science Teaching Departments of Faculty of Education. The study involved a total of 220 individuals; 52 from Classroom Teaching Department, 73 from Science Teaching Department, 48 from Computer Education and Instructional Technology (CEIT) Department and 47 from Primary School Mathematics Teaching Department. 143 of the participants were females and 77 were males out of 220 individuals in the working group. 101 of the participants were in their first year, 22 in second year, 55 in third year and 42 in their fourth year at the time of the study. 124 of the participants in the working group graduated from general secondary schools whereas 96 participants graduated from other types of secondary schools. Families of 102 of the participants in the working group lived in city centers and families of the remaining 118 lived in other settlement areas (district, towns and villages). Table 1 presents data about the gender, department, year at school, vocation of father and location of family settlement of the students.

Table 1: Demographic characteristics of teacher candidates

	Characteristic	*N*	*%*
Gender	Female	143	65
	Male	77	35
Department	Classroom teaching	52	23.6
	Primary school mathematics Teaching	47	21.4
	Science teaching	73	33.2
	CEIT	48	21.8
Type of High School Graduation	General secondary school	124	56.4
	Other types of secondary schools	96	43.6
Year	1.Year	101	45.9
	2. Year	22	10
	3. Year	55	25
	4. Year	42	19.1
Location of Family Settlement	City center	102	46.4
	Other settlement areas	118	53.6
Vocation of Father	Laborer	46	20.9
	Civil servant	47	21.4
	Artisan	29	13.2
	Self -employed	43	19.5
	Other vocations	55	25

Data Collection Tool

"The California Critical Thinking Disposition Inventory (CCTDI)" was utilized in the study to

find out critical thinking dispositions of teacher candidates. The original form of the inventory is composed of 75 items and 7 sub dimensions. The inventory was adapted to Turkish by Kokdemir (2003). The Turkish version includes 51 items and 6 sub dimensions that are Analyticity, Open-mindedness, Inquisitiveness, Confidence in Reasoning, Truth-seeking and Systematicity. 6 point Likert type scale includes statements as follows: "Completely Agree, Agree, Partially agree, Partially Disagree, Disagree and Completely Disagree". Cronbach Alpha Reliability Coefficient of the Turkish version of the inventory was found to be 0.88 and a value of 0.84 was obtained in the current study.

Data Analysis

Data obtained with the help of inventory was analyzed for frequencies, percentages, arithmetic means, ANOVA and t-tests. Results obtained after analysis were interpreted and implications were discussed. SPSS program was used in data analysis. Level of significance was set at $p<0.05$. As suggested in the original scale, the answers provided to 6-point Likert type scale were added and raw scores were calculated for each sub dimension which were later converted to standard scores between minimum 6 and maximum 60 by first dividing it to the number of questions and by multiplying the result with 10. Possible minimum and maximum values for all sub dimensions are fixed (Facione et al. 1995; Kokdemir 2003). Individuals with scores lower than 40 for each sub dimension has low level of disposition in this dimension and individuals with scores higher than 50 for each sub dimension has high level of disposition in this dimension. Therefore, when CCTDI is assessed as a whole, individuals whose scores are less than 240 (40x6) will have low general critical thinking dispositions and individuals whose scores are more than 300 (50x6) will have high general critical thinking dispositions. In the current study, individuals with scores less than 4 for each sub dimension were accepted as having low critical thinking disposition, individuals with scores between 4 and 5 for each sub-dimension were accepted as having positive critical thinking disposition and individuals with scores higher than 5 for each sub dimension were accepted as having high critical thinking disposition.

FINDINGS

First question in research is "what is the arithmetic mean of critical thinking dispositions of teacher candidates?" Analyses undertaken to answer this question are presented in Table 2. As can be seen from Table 2, teacher candidates with scores less than 4 for the total inventory were accepted as having low critical thinking disposition, teacher candidates with scores between 4 and 5 were accepted as having positive critical thinking disposition and teacher candidates with scores higher than 5 were accepted as having high critical thinking disposition. Investigation of the data presented in the table shows the lowest value as 2.90, the highest value as 5.45 and the mean as M=4.24. According to this result, it can be claimed hat teacher candidates' general critical thinking disposition is positive. When dimensions are examined, it is seen that teacher candidates have low disposition in "truth seeking" sub dimension and high disposition in "Analyticity, Open-mindedness, Inquisitiveness, Confidence in Reasoning and Systematicity" sub dimensions.

Table 3 presents the findings regarding the critical thinking disposition of teacher candidates according to gender. Investigation of the analyticity sub dimension in Table 3 shows that female teacher candidates arithmetic means in analyticity sub dimension (M=4.95) is higher than

Table 2: Critical thinking dispositions of teacher candidates

	Number of students(N)	*Lowest mean*	*Highest mean*	*Arithmetic mean (M)*	*Standard deviation (sd)*
Analyticity	220	2.50	6.00	4.84	0.666
Open-mindedness	220	2.17	6.00	4.15	0.761
Inquisitiveness	220	2.22	6.00	4.58	0.741
Confidence in reasoning	220	2.00	6.00	4.28	0.716
Truth-seeking	220	1.43	6.00	3.37	0.800
Systematicity	220	1.83	6.00	4.19	0.856
Total	220	2.90	5.45	4.24	0.479

Table 3: Critical thinking disposition according to gender

Factor	*Gender*	*N*	*M*	*SD*	*Levene Test*				
					F	*p*	*df*	*t*	*p*
Analyticity	Female	143	4.95	0.57	4.114	0.004	218	3.551	0.000
	Male	77	4.62	0.76					
Open-mindedness	Female	143	4.21	0.73	1.906	0.169	218	1.672	0.096
	Male	77	4.03	0.79					
Inquisitiveness	Female	143	4.60	0.72	1.366	0.244	218	0.702	0.484
	Male	77	4.53	0.77					
Confidence in reasoning	Female	143	4.29	0.71	0.016	0.900	218	0.132	0.895
	Male	77	4.27	0.72					
Truth-seeking	Female	143	3.39	0.82	0.464	0.497	218	0.410	0.682
	Male	77	3.34	0.75					
Systematicity	Female	143	4.23	0.83	0.722	0.396	218	0.834	0.405
	Male	77	4.13	0.89					
Total	Female	143	4.29	0.44	4.283	0.040	218	2.052	0.041
	Male	77	4.15	0.52					

that of male teacher candidates (M=4.62). When p value was examined to see whether this difference was meaningful, we obtain the value of $p<0.05$ ($t_{(218)}=3.551$; p=000). This finding shows the existence of a meaningful difference between teacher candidates' gender and analyticity sub dimension. According to this finding, it can be said that female teacher candidates have higher analyticity dispositions compared to male teacher candidates.

It was seen that teacher candidates' views for Open-mindedness ($t_{(218)}=1.672$; p=0.096). Inquisitiveness ($t_{(218)}=0.702$; p=0.484). Confidence in Reasoning ($t_{(218)}=0.132$; p=0.895). Truth-seeking ($t_{(218)}=0.410$; p=0.682) and Systematicity ($t_{(218)}=0.834$; p=0.405) sub dimensions did not change according to gender. Total critical thinking scores of teacher candidates show that female teacher candidates' critical thinking disposition arithmetic mean (M=4.29) was higher than that of male teacher candidates (M=4.15). Investigation of p value to see whether the difference between teacher candidates' total critical thinking disposition arithmetic mean was meaningful gives the value of $p<0.05$ ($t_{(218)}=2.052$; p=0.041). This finding points to a meaningful difference between the gender of teacher candidates and critical thinking disposition. According to the finding, it can be claimed that female teacher candidates have higher critical thinking disposition compared to male teacher candidates.

Table 4 presents the change in critical thinking disposition according to type of secondary school that teacher candidates graduated from. Table 4 shows that critical thinking disposition of teacher candidates regarding the sub dimensions of Analyticity ($t_{(218)}=-0.349$; p=0.727). Open-mindedness ($t_{(218)}=0.532$; p=0.595). Inquisitiveness ($t_{(218)}=0.557$; p=0.578). Confidence in Reasoning ($t_{(218)}=-0.898$; p=0.370). Truth-seeking ($t_{(218)}=1.415$; p=0.158) and Systematicity ($t_{(218)}=1.859$; p=0.064) did not change according to type of secondary school they graduated from. Investigation of total critical thinking disposition shows no meaningful differences between critical thinking disposition of teacher candidates and type of secondary school they graduated from ($t_{(218)}=0.768$; p=0.443).

Table 5 displays the change in critical thinking disposition according to class levels of teacher candidates. Investigation of Analyticity subdimension in Table 5 shows a meaningful difference between class levels of teacher candidates and their disposition towards Analyticity ($F(3.216)=7.164$; p=0.00). Tukey analysis was implemented to observe between which groups the difference occurred. Results of the Tukey analysis shows that the difference was in favor of the 1st year students between 1st and 3rd year teacher candidates and in favor of 1st year students between 1st and 4th year teacher candidates. In terms of Inquisitiveness sub dimension, arithmetic mean for disposition for inquisitiveness for 1st year students was found to be M=4.63, arithmetic mean for disposition for inquisitiveness for 2nd year students was found to be M=4.83, arithmetic mean for disposition for inquisitiveness for 3rd year students was found to be M=4.36 and arithmetic mean for disposition for inquisitiveness for 4th year students was found to be M=4.59. p value points to a statistically significant difference. Bonferonni analysis was implemented to see between which groups the

Table 4: Critical thinking disposition of teacher candidates according to type of secondary school they graduated from

Factor	*High Schoo Graduation*	*N*	*M*	*SD*	*F*	*p*	*df*	*t*	*p*
Analyticity	General secondary schools	124	4.82	0.69	1.288	0.258	218	-0.349	0.727
	Other types of sec. sch.	96	4.85	0.63					
Open-mindedness	General secondary schools	124	4.17	0.74	0.409	0.523	218	0.532	0.595
	Other types of sec. sch.	96	4.11	0.78					
Inquisitiveness	General secondary schools	124	4.60	0.73	0.462	0.498	218	0.557	0.578
	Other types of sec. sch.	96	4.54	0.74					
Confidence in Reasoning	General secondary schools	124	4.24	0.73	0.034	0.853	218	-0.898	0.370
	Other types of sec. sch.	96	4.33	0.69					
Truth-seeking	General secondary schools	124	3.44	0.76	1.678	0.197	218	1.415	0.158
	Other types of sec. sch.	96	3.28	0.83					
Systematicity	General secondary schools	124	4.29	0.83	0.302	0.583	218	1.859	0.064
	Other types of sec. sch.	96	4.07	0.87					
Total	General secondary schools	124	4.26	0.49	0.023	0.879	218	0.768	0.443
	Other types of sec. sch.	96	4.21	0.46					

difference occurred. Analysis results show that a significant difference existed between 1st and 3rd year students and between 2nd and 3rd year students and the differences were in favor of 1st year students and 2nd year students respectively (F(3.216)=2.719; p=0.046).

No significant differences were observed between class levels of teacher candidates and their dispositions related to CCTDI sub dimensions of Open-mindedness (F(3.216)=1.074; p=0.361), Confidence in Reasoning (F(3.216)= 1.714; p=0.165), Truth-seeking (F-) and Systematicity (F(3.216)=0.436; p=0.728). Examination of Table 5 shows that total critical thinking disposition scores of teacher candidates did not change according to class levels (F(3.216)=2.329; p=0.975).

Table 6 presents the findings regarding the change in critical thinking disposition based on teacher candidates' fathers' vocations. Table 6 shows that no statistically meaningful difference existed between teacher candidates' critical thinking disposition regarding the sub dimensions of Analyticity (F(4.215)=0.992; p=0.413), Open-mindedness (F(4.215)=1.386; p=0.240), Inquisitiveness (F(4.215)=0.243; p=0.914), Confidence in Reasoning (F(4.215)=0.645; p=0.631), Truth-seeking (F(4.215)=0.183; p=0.947) and Systematicity (F(4.215)=1.396; p=0.236) and the total inventory (F(4.215)=1.078; p=0.368) and their fathers' vocations.

Table 7 presents the change in critical thinking disposition of teacher candidates according to the location of family settlement Table 7 shows that that no statistically meaningful difference existed between teacher candidates' critical thinking disposition regarding the sub dimensions of Analyticity ($t_{(218)}$=-1.081; p=0.281), Open-mindedness ($t_{(218)}$=0.139; p=0.890), Inquisitiveness ($t_{(218)}$=-0.845; p=0.399), Confidence in Reasoning ($t_{(218)}$=0.325; p=0.746), Truth-seeking ($t_{(218)}$=-0.096; p=0.924) and Systematicity ($t_{(218)}$=-0.079; p=0.937) and the total inventory ($t_{(218)}$=-0.261; p=0.794) and the location of family settlement.

Table 5: Critical thinking disposition according to class level

Factor	*Year at university*	*N*	*M*	*sd*	*Source of variance*	*Mean square*	*df*	*F*	*P*	*Meaningful difference*
Analyticity	1.Year	101	5.04	0.54	Between groups	2.934	3	7.164	0.000	1 – 3
	2. Year	22	4.85	0.62						
	3. Year	55	4.64	0.64	In-group	0.409	216			
	4. Year	42	4.84	0.66						
Open-mindedness	1. Year	101	4.23	0.77	Between groups	0.622	3	1.074	0.361	
	2. Year	22	3.92	0.76						
	3. Year	55	4.10	0.77	In-group	0.579	216			
	4. Year	42	4.12	0.70						
Inquisitiveness	1. Year	101	4.63	0.72	Between groups	1.459	3	2.719	0.046	1 – 3 2 – 3
	2. Year	22	4.83	0.70						
	3. Year	55	4.36	0.79	In-group	0.537	216			
	4. Year	42	4.59	0.66						
Confidence in Reasoning	1. Year	101	4.29	0.74	Between Groups	0.871	3	1.714	0.165	
	2. Year	22	4.51	0.69						
	3. Year	55	4.13	0.73	In-group	0.508	216			
	4. Year	42	4.35	0.59						
Truth-seeking	1. Year	101	3.40	0.86	Between groups	0.424	3	0.659	0.578	
	2. Year	22	3.51	0.73						
	3. Year	55	3.25	0.77	In-group	0.644	216			
	4. Year	42	3.38	0.70						
Systematicity	1. Year	101	4.22	0.86	Between groups	0.322	3	0.436	0.728	
	2. Year	22	4.34	0.84						
	3. Year	55	4.11	0.79	In-group	0.740	216			
	4. Year	42	4.15	0.92						
Total	1. Year	101	4.31	0.45	Between groups	0.525	3	2.329	0.075	
	2. Year	22	4.30	0.50						
	3. Year	55	4.11	0.47	In-group	0.226	216			
	4. Year	42	4.20	0.51						

Table 8 presents the findings obtained regarding the departments teacher candidates enrolled in and their critical thinking dispositions. Examination of analyticity sub dimension in Table 8 shows a statistically meaningful difference between analyticity dispositions of teacher candidates and their departments (F(3.216)=7.204; p=0.00). Tukey analysis was implemented to observe between which groups this difference occurred. Analysis results show that results were in favor of Classroom Teaching students between Classroom Teaching and CEIT; of Science Teaching students between Primary School Mathematics Teaching and Science Teaching and of CEIT students between Science Teaching and CEIT.

A meaningful difference was observed between Truth-seeking dispositions of teacher candidates and their departments (F(3.216)=2.989; p=0.032). According to Tukey analysis, results were in favor of Primary School Mathematics Teaching students between Primary School Mathematics Teaching and CEIT department teacher candidates.

A meaningful difference was observed between Systematicity dispositions of teacher candidates and their departments (F(3.216)=4.479; p=0.004). According to Tukey analysis results undertaken to observe between which groups this difference occurred, results were in favor of Primary School Mathematics Teaching students between Primary School Mathematics Teaching students and CEIT department teacher candidates and in favor of Science Teaching students between Science Teaching and CEIT department teacher candidates.

Table 6: Critical thinking disposition according to father's vocation

Factor	*Father's vocation*	*N*	*M*	*sd*	*Source of variance*	*Mean square*	*df*	*F*	*p*
Analyticity	Laborer	46	4.78	0.64	Between groups	0.440	4	0.992	0.413
	Civil servant	47	4.89	0.54					
	Artisan	29	5.02	0.78					
	Self- employed	43	4.74	0.68	In-group	0.444	215		
	Other vocations	55	4.81	0.69					
Open-mindedness	Laborer	46	4.18	0.77	Between groups	0.798	4	1.386	0.240
	Civil servant	47	4.15	0.78					
	Artisan	29	4.41	0.69					
	Self- employed	43	4.08	0.79	In-group	0.576	215		
	Other vocations	55	4.02	0.72					
Inquisitiveness	Laborer	46	4.54	0.86	Between groups	0.135	4	0.243	0.914
	Civil Servant	47	4.51	0.67					
	Artisan	29	4.62	0.78					
	Self- employed	43	4.58	0.67	In-group	0.557	215		
	Other Vocations	55	4.64	0.72					
Confidence in Reasoning	Laborer	46	4.19	0.73	Between groups	0.333	4	0.645	0.631
	Civil servant	47	4.42	0.68					
	Artisan	29	4.27	0.86					
	Self- employed	43	4.27	0.59	In-group	0.516	215		
	Other vocations	55	2.26	0.73					
Truth-seeking	Laborer	46	3.37	0.88	Between groups	0.119	4	0.183	0.947
	Civil servant	47	3.29	0.78					
	Artisan	29	3.38	0.70					
	Self- employed	43	3.42	0.80	In-group	0.651	215		
	Other vocations	55	3.40	0.80					
Systematicity	Laborer	46	4.15	0.89	Between groups	1.017	4	1.396	0.236
	Civil servant	47	4.18	0.86					
	Artisan	29	4.54	0.81					
	Self- employed	43	4.11	0.84	In-group	0.729	215		
	Other vocations	55	4.12	0.83					
Total	Laborer	46	4.21	0.52	Between groups	0.247	4	1.078	0.368
	Civil servant	47	4.26	0.43					
	Artisan	29	4.40	0.50					
	Self- employed	43	4.19	0.42	In-group	0.229	215		
	Other vocations	55	4.21	0.50					

Table 7: Critical thinking disposition of teacher candidates according to the location of family settlement

Factor	*Location of family settlement*	*N*	*M*	*sd*	*Levene Test*		*df*	*t*	*p*
					F	*P*			
Analyticity	City center	102	4.78	0.65	0.061	0.805	218	-1.081	0.281
	Other settl. are..	118	4.88	0.67					
Open-mindedness	City center	102	4.15	0.73	0.119	0.730	218	0.139	0.890
	Other settl. are..	118	4.14	0.78					
Inquisitiveness	City center	102	4.53	0.75	0.304	0.582	218	-0.845	0.399
	Other settl. are..	118	4.61	0.72					
Confidence in Reasoning	City center	102	4.30	0.70	0.119	0.730	218	0.325	0.746
	Other settl. are..	118	4.27	0.72					
Truth-seeking	City center	102	3.36	0.82	0.026	0.871	218	-0.096	0.924
	Other settl. are..	118	3.38	0.78					
Systematicity	City center	102	4.19	0.83	0.225	0.636	218	-0.079	0.937
	Other settl. are..	118	4.20	0.87					
Total	City center	102	4.23	0.45	0.063	0.802	218	-0.261	0.794
	Other settl. are..	118	4.25	0.49					

Table 8: Teacher candidates' critical thinking dispositions according to department

Factor	*Year at University*	*N*	*M*	*sd*	*Source of variance*	*Mean square*	*df*	*F*	*P*	*Meaningful difference*
Analyticity	Classroom teaching	52	4.92	0.58	Between groups	2.949	3	7.204	0.000	1 – 4 2 – 3
	Primary sch. math. teaching	47	4.65	0.65						3 – 4
	Science teaching	73	5.06	0.53	In groups	0.409	216			
	CEIT	48	4.58	0.81						
Open-mindedness	Classroom teaching	52	4.31	0.69	Between groups	0.642	3	1.109	0.346	
	Primary sch. math. teaching	47	4.07	0.70						
	Science teaching	73	4.08	0.81	In groups	0.579	216			
	CEIT	48	4.14	0.79						
Inquisitiveness	Classroom Teaching	52	4.55	0.77	Between groups	1.192	3	2.205	0.088	
	Primary sch. math. teaching	47	4.46	0.72						
	Science teaching	73	4.75	0.67	In groups	0.540	216			
	CEIT	48	4.46	0.78						
Confidence in Reasoning	Classroom teaching	52	4.17	0.69	Between groups	0.966	3	1.906	0.130	
	Primary sch. math. teaching	47	4.27	0.61						
	Science teaching	73	4.44	0.75	In groups	0.507	216			
	CEIT	48	4.18	0.74						
Truth-seeking	Classroom teaching	52	3.39	0.84	Between groups	1.865	3	2.989	0.032	2 - 4
	Primary sch. math. teaching	47	3.54	0.73						
	Science teaching	73	3.44	0.83	In groups	0.624	216			
	CEIT	48	3.08	0.70						
Systematicity	Classroom teaching	52	4.07	0.82	Between groups	3.139	3	4.479	0.004	2 – 4 3 - 4
	Primary sch. math. teaching	47	4.37	0.75						
	Science teaching	73	4.38	0.86	In groups	0.701	216			
	CEIT	48	3.88	0.88						
Total	Classroom teaching	52	4.26	0.43	Between groups	0.682	3	3.055	0.029	3 - 4
	Primary sch. math. teaching	47	4.21	0.61						
	Science Teaching	73	4.35	0.47	In groups	0.223	216			
	CEIT	48	4.09	0.52						

It was seen that Open-mindedness (F(3.216)=1.109; p>0.346), Inquisitiveness (F(3,216)=2,205; p=0,080) and Confidence in Reasoning (F(3.216)=1.906; p=0.130) sub- dimensions did not change according to department that the teacher candidates enrolled in.

Examination of the findings against the total scores shows a statistically meaningful difference between teacher candidates' departments and their critical thinking dispositions (F(3.216)=3.055; p=0.029). It was observed that this difference was in favor of Science Teaching

students between Science Teaching and CEIT department teacher candidates.

DISCUSSION

Results of analyses show that critical thinking dispositions of teacher candidates are positive. This result is compatible with the findings obtained by Profetto-McGrath (2003), Korkmaz (2009), Kurum (2002), Besoluk and Onder (2010) Turnuklu and Yesildere (2005). However, the studies of Reed and Kromrey (2001), Gillespie and Culpan (2000), Kokdemir (2003), Cetinkaya (2011), Akar (2007), Zayif (2008), Selvi and Argon (2011) identified low critical thinking dispositions in teacher candidates. According to the study undertaken by Kartal (2012) teachers were found to have high critical thinking dispositions.

Examination of sub dimensions in teacher candidates' critical thinking dispositions shows positive disposition in analyticity sub dimension. In Turnuklu and Yesildere's (2005) studies, students were found to have positive dispositions in analyticity sub dimension as well. In the studies of Kartal (2012) and Cetinkaya (2011), teacher candidates were observed to display high disposition in analyticity sub dimension. Selvi and Argon (2011) stated that disposition in analyticity sub dimension was at the level of "Agree". In line with the findings, we can claim that teacher candidates' dispositions in analyticity sub dimension were positive in general and can be further increased.

Based on the findings obtained in the study, it can be claimed that teacher candidates have positive disposition in open-mindedness sub dimension. The studies of Kartal (2012) and Turnuklu and Yesildere (2005) also identified positive dispositions in open-mindedness sub dimension. According to Zayif (2008) and Cetinkaya's (2011) studies, teacher candidates have high dispositions in open-mindedness sub dimension. Selvi and Argon (2011) stated that disposition in open-mindedness sub dimension was at the level of "Partially Agree". It was observed that teacher candidates have positive dispositions in open-mindedness sub dimension in general. The fact that teacher candidates are open minded, care for different perspectives and are flexible in thinking is a rather good and desired outcome for our educational system.

It was seen that teacher candidates' dispositions for inquisitiveness and confidence in reasoning sub dimensions are positive. In Turnuklu and Yesildere's (2005) studies, it was also found that teacher candidates' dispositions were positive in inquisitiveness and confidence in reasoning sub dimensions. In Zayif's (2008) study, disposition was found to be low in inquisitiveness and confidence in reasoning sub dimensions. However, Kartal (2012) identified disposition to be high in inquisitiveness and confidence in reasoning sub dimensions. According to these results, it can be said that full integrity does not exist between teacher candidates' dispositions in inquisitiveness and confidence in reasoning sub dimensions however, a positive direction is observed.

It was identified that teacher candidates' dispositions for truth-seeking sub-dimension are low. Zayif (2008), Turnuklu and Yesildere (2005) and Cetinkaya's (2011) studies also pointed to low disposition for truth seeking in teacher candidates. However, Kartal (2012) identified positive disposition for truth seeking in teacher candidates. According to these findings, we see that disposition towards truth seeking sub dimension is generally low. We can induce that teacher candidates use the information presented to them without questioning, regard it as correct and memorizes it.

Examination of systematicity sub-dimension shows a positive disposition on the part of teacher candidates. Kartal (2012) also found out positive disposition for systematicity sub-dimension. However, Zayif (2008) and Cetinkaya's (2011) studies identified the disposition for systematicity sub dimension as low.

Examination of the relationship between teacher candidates' critical thinking dispositions and gender shows a meaningful relationship between critical thinking dispositions and gender. The findings point to higher disposition in female teacher candidates compared to male teacher candidates. This result corresponds with the results of studies undertaken by Facione et al. (1995), Rudd et al. (2000), Cetinkaya (2011), Zayif (2008), Kokdemir (2003), Besoluk and Onder (2010). Korkmaz (2009), Kurum (2002) and Ekinci's (2009) studies did not point to a meaningful relationship between the genders of teacher candidates in this regard. In Kartal's (2012) study, female teacher candidates' critical thinking disposition was found to be higher than that of male teacher candidates.

When gender and critical thinking disposition relationship was examined in terms of sub dimensions, a meaningful relationship was observed between analyticity sub dimension and gender in favor of female teacher candidates. Kokdemir (2003), Cetinkaya (2011) and Zayif's (2008) studies also identified a meaningful relationship in analyticity sub dimension in favor of female teacher candidates. There are no meaningful relationships between gender and other sub dimension such as open-mindedness, inquisitiveness, confidence in reasoning, truth-seeking and systematicity. According to these results, it would be suitable to eliminate these differences in the critical thinking disposition of female and male teacher candidates.

Examination of the relationship between critical thinking disposition and the type of secondary schools that teacher candidates graduated from shows no meaningful relationship. Cetinkaya (2011) and Zayif's (2008) studies also pointed to that fact that no statistically meaningful relationship existed between critical thinking disposition and the type of secondary schools that teacher candidates graduated from. However, Kurum's (2002) study identified a meaningful relationship between critical thinking disposition and type of secondary school that the teacher candidates graduated from and the difference was found to be in favor of Anatolian High Schools. Besoluk and Onder's (2010) study found a meaningful relationship between type of high school teacher candidates graduated from and their critical thinking dispositions and identified Anatolian High School graduates to be the teacher candidates with the lowest critical thinking dispositions. When critical thinking disposition was investigated in terms of sub dimensions, a meaningful difference was not observed.

Current study investigated the relationship between teacher candidates' critical thinking dispositions and class levels and no meaningful relationships were observed between the general total critical thinking disposition and class level. Ekinci (2009) and Besoluk and Onder's (2010) studies also pointed to the no relationship between teacher candidates' critical thinking dispositions and class levels. However, when critical thinking disposition was investigated in terms of its sub dimensions, meaningful relationships were identified in analyticity and inquisitiveness sub dimensions. It was found that analytical thinking disposition of first year students were more positive compared to that of third and fourth year students. Zayif (2008) also reached similar results in analyticity sub dimension. It was found that first year students had higher analytical thinking disposition compared to second and third year students. A meaningful relationship between teacher candidates' inquisitiveness sub dimension and class levels was identified. It was observed that first and second year teacher candidates had higher values in inquisitiveness sub dimension compared to third year students. No meaningful relationships were detected between class levels and other sub dimensions. Cetinkaya (2011) and Akar's (2007) studies showed that critical thinking disposition decreased along with increase in class levels. Kurum (2002) identified meaningful relationships in only one sub dimension. In interpretation sub dimension, it was found that second year students had higher tendencies for interpretation compared to first year students.

Zayif (2008) and Shin et al. (2006) however stated that critical thinking dispositions increased with class levels. The expected outcome was an increase in critical thinking disposition along with increase in class levels. However the obtained results do not correspond with the expected outcomes. It is imperative to research the reasons for this incompatibility and generate solutions.

Current study also investigated the relationship between teacher candidates' critical thinking dispositions and the vocations of teacher candidates' fathers and found that no meaningful relationship existed between the two. Kartal's (2012) study did not find a relationship between teacher candidates' critical thinking dispositions and the vocations of teacher candidates' fathers as well. When critical thinking disposition was investigated in terms of sub dimensions, no meaningful relationships were identified. Investigation of the relationship between teacher candidates' critical thinking dispositions and the location of family settlement showed no meaningful relationships. When critical thinking disposition was investigated in terms of sub dimensions, no meaningful relationships were identified as well. However, Dil (2001) found that increases in socio-economic level result in increases in critical thinking disposition. Miller (1990), Cheung et al. (2001) and Klau (1996) stated that socio-economic factor is an effective factor in critical thinking disposition.

Investigation of the relationship between teacher candidates' departments and their critical thinking dispositions showed a meaningful relationship. It was identified that critical thinking dispositions of teacher candidates in Science Teaching Department were higher than those of teacher candidates enrolled in CEIT. Kurum's (2002) study pointed out a meaningful relationship between critical thinking disposition and teacher candidates' departments. In Kurum's (2002) study, the department whose students had lowest critical thinking disposition was identified as German Teaching Department whereas the departments whose students had the highest critical thinking disposition were found to be CEIT, Primary School Mathematics Teaching and English Teaching Departments. Zayif's (2008) study also identified a meaningful relationship between teacher candidates' critical thinking disposition and their departments. It is possible to come across studies in literature which state findings that students in Science Teaching Departments have higher critical thinking dispositions compared to students in Social Sciences Departments (Klau 1996; Tsui 1999; Zayif 2002). Korkmaz (2009), Ekinci (2009) and Besoluk and Onder's (2010) studies did not identify a meaningful relationship between teacher candidates' critical thinking dispositions and their departments. Zayif (2008) also identified a meaningful relationship among departments in truth-seeking sub dimension and stated that social sciences teacher candidates have higher critical truth seeking disposition.

CONCLUSION

Current study aimed to identify general critical thinking dispositions of teacher candidates, to determine the impact rate of different variables on critical thinking disposition and to achieve results that would contribute to education. In this framework, identification of general critical thinking dispositions of teacher candidates was undertaken.

When critical thinking disposition was investigated in terms of sub dimensions, meaningful relationships were identified in analyticity, truth-seeking and systematicity sub- dimensions. In analyticity sub dimension, a meaningful relationship was identified between Classroom Teaching and CEIT departments and that classroom teaching teacher candidates were found to have higher critical thinking disposition compared to CEIT teacher candidates. Significant relationships were also found between Science Teaching and CEIT and Primary School Mathematics Departments. It was observed that critical thinking dispositions of science teaching teacher candidates were higher than those of CEIT and Primary School Mathematics Teaching teacher candidates. A meaningful relationship was detected between Primary School Mathematics Teaching and CEIT departments in truth-seeking sub dimension. It was identified that critical thinking dispositions of Primary School Mathematics Teaching teacher candidates were higher than those of CEIT teacher candidates.

Investigation of the relationship between systematicity and departments in systematicity sub dimension showed a meaningful relationship. When the systematicity disposition of CEIT and Primary School Mathematics Teaching and Science Teaching teacher candidates was compared, it was found that teacher candidates' systematicity disposition in CEIT department was lower than that of teacher candidates in both departments. Examination of current results shows that CEIT teacher candidates have lower critical thinking dispositions. It is imperative to undertake arrangements and studies to overcome this problem.

Consequently, it is vital to create suitable environment that they can acquire and use critical thinking skills through the education process. At the same time, lecturers who are to train teacher candidates should have critical thinking skills and use them as being a good model. Because of this, applications and activities that improve and help critical thinking must be included in educational programs that are designed to train teaching staff of universities.

RECOMMENDATIONS

To increase the critical thinking levels of the teacher candidates and making them gain these skills, the followings are suggested:

- To progress the critical thinking skills of the teacher candidates, in all of the courses, there should be activities that will make the students gain these skills. In addition, all the instructors should be supported to improve themselves to be able to do this.
- There should be socio-cultural activities devoted to improve the teacher candidates'

critical thinking skills and the candidates should be encouraged to attend them.

- For improving the critical thinking skills of the students at every educational level, different critical thinking program has to be developed which helps teachers make critical thinking an integral part of classroom instruction.
- This study implemented on preservice teachers. For future study, it can be any researches implemented on more group of student.

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