

Full Length Research Paper

## Critical thinking dispositions of pre-service teachers

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**This study investigated the critical thinking dispositions of pre-service teachers in terms of various variables. The study included 1106 participants and used the survey model and the Turkish version (CCTDI-T) of the California Critical Thinking Disposition Inventory (CCTDI). The reliability of the scale for this study was found to be .82. The significance level of the study was set at .01. The study identified significant differences in the critical thinking dispositions of pre-service teachers with respect to departments, but found no significant differences with respect to class or gender. The study found that in general teachers tend to have low disposition toward critical thinking, and identified a positive but weak relationship between academic achievement and critical thinking dispositions.**

**Key words:** CCTDI, critical thinking disposition, pre-service teachers.

### INTRODUCTION

*"The mind is its own place and in itself can make a hell of heaven or a heaven of hell".*

*John Milton, Paradise Lost (Cited by, Paul and Elder, 2006)*

There is a close relationship between democracy and the level of education, since undemocratic practices cannot be exercised in a country where the level of education is high, and it is impossible to find a democratic country where the level of education is very low (Özden, 2003). According to Özden (2003), democracy can only exist when people are able to make decisions and evaluate situations on their own. One of the requirements for a healthy democracy is people who can think critically (Özden, 2003). Critical thinking is expected to have a positive influence on decision making and problem solving (Kökdemir, 2003). When they encounter ideas that contradict their own ideas, people who cannot think

critically look for ways to silence people instead of listening to them or adapting to those new ideas. On the contrary, a person who can think critically is open-minded enough to be able to express that he/she does not like the idea but can respect it (Özden, 2003).

The educational system contributes to a society's future and the level of its welfare. If an education system does not foster free thinking, it produces individuals who accept what they are told without questioning and cannot easily make decisions. There is no place for such systems in today's environment. Modern education systems have the goal of raising individuals who are innovator, literate and can think creatively and critically (Akinoğlu, 2002; Pithers and Soden, 2000; Aybek, 2006). Educators and people working in the other fields of education desire programs that can develop critical thinking skills (King et al., 1990). Critical thinking is not only important for educators but also is identified by

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employers as an important quality in college graduates (Lederer, 2007). Teaching students to think critically is really one of the most important tasks of the education system because university students are expected to exhibit critical thinking skills (Kromney and Reed, 2001).

### What is critical thinking?

There are many definitions of critical thinking in literature. We all know when we hear “critical thinking”, it brings to mind good things. For example critical thinking is opposed of illogical thinking (Facione, 2011). Epstein and Kernberger (2006) define thinking critically as defence against a world of too much information and people trying to convince us. Rudinow and Barry (2008) define critical thinking as using reason to make up your mind. According to Ennis (1993), “critical thinking is reasonable reflective thinking focuses on deciding what to believe or do”. Critical thinking requires skills that help us solve problems, understand concepts, develop well-grounded opinions and become a highly educated person in any profession (Alvarado, 2008).

With reference to Paul and Elder (2006), “critical thinking is the art of thinking while thinking in order to make thinking better. It involves three interwoven phases: it analyzes thinking, it evaluates thinking and improves thinking”. That is to say that critical thinking is a type of thinking in which the thinker enhances his/her thinking by analyzing which means to identify its purpose, question, information etc, assessing which means to check it for clarity, accuracy, relevance etc. and reconstructing which means to build on its strengths while reducing its weaknesses (Paul and Elder, 2006).

Facione (2011) tells the critical thinker with effective trial lawyers’ example. First, they listen to witness, collect evidence, analysis, evaluate, interpret all, including evidence presented by opposition lawyers and the arguments advanced by the other side. And they try to convince the judge and jury. A critical thinker is “neither dogmatic nor gullible”; in contrast his/her attitudes are open-mindedness, intellectual humility and skepticism (Carroll, 2000). A critical thinker uses specific criteria to assess reasoning and make decisions (Diestler, 2001). If so, what might happen in failures of critical thinking in our life? Facione (2011) determines that failures of critical thinking may play role in ineffective law enforcement, job loss, distorted communications, bad decisions, mismanagement, academic failure etc.

In the later of 20th century, some researchers focus on the dispositional side of critical thinking while some researchers pay attention to the cognitive skills related with critical thinking (Perkins et al., 1993; Cited by Tümkaya et al., 2009). Colucciello (1997) reported that there was a significant positive relationship between critical thinking and critical thinking dispositions. Lederer (2007) describes critical thinking dispositions as

precursors to the development of critical thinking skills. Paul (1993) identified critical thinking dispositions as intellectual characters such as intellectual humility, intellectual civility, intellectual curiosity etc. (Cited by, Colucciello, 1999). As for Facione (2011), critical thinking dispositions include seven components; truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness and maturity.

Though critical thinking was thought as an important goal of education in 20th century, it had not drawn attention adequately until in the later of 20th century (Ennis, 1993). There are many studies in the literature that relate critical thinking to a number of variables. Ishiyama et al. (1999) established a significant relationship between the disposition toward critical thinking and current education methods as a result of the study they did to study the disposition toward critical thinking in terms of different variables. According to Seferoğlu and Akbıyık (2006), there are some crucial differences between individuals who have critical thinking skills and those who lack critical thinking skills in terms of the way they select, organize and use data. The literature indicates that students who have and use critical thinking skills learn more effectively. In a study comparing the critical thinking dispositions of master’s and doctoral students, Onwuegbuzie (2001) stated that the dispositions of doctorate students toward critical thinking are significantly higher than that of master’s degree students, concluding that students’ critical thinking skills are directly related to level of education. In a study by Koray et al. (2007) about the effect of creative and critical thinking-based science laboratory practices on pre-service teachers’ academic achievement and scientific process skills levels, the authors concluded that students who use creative and critical thinking-based laboratory practices are more advanced than those who apply traditional laboratory practices. Another study conducted with university students found that there is a certain degree of relationship between pre-service teachers’ learning styles and their disposition to critical thinking (Güven and Kürüm, 2008).

To summarize, it has been found that critical thinking is closely related to education and that individuals who have a disposition toward critical thinking are different in important ways (academic achievement, skills with scientific processes, reactions to the problems they face, etc.) when compared with individuals who do not have a disposition toward critical thinking. Moreover, it could be said that individuals who have a disposition toward critical thinking think more realistically about superstitions, which is a major problem in underdeveloped countries, and they are also more sensitive to social issues. Therefore, it becomes even more critical to encourage critical thinking in pre-service teachers because they will take a prominent role in the direction of the society by training up future generations. Lederer (2003) suggests that educators must give opportunity to enhance the critical thinking skills

of students. So, firstly teachers must be critical thinker. This study investigated the critical thinking dispositions not only of pre-service teachers but also indirectly of the students they will teach in the future.

The goal of this study was to analyze the critical thinking dispositions of pre-service teachers in terms of different variables (department, class, gender and academic achievement). This study sought answers to the following research questions:

- 1) What level of disposition do pre-service teachers have toward critical thinking?
- 2) Are the critical thinking dispositions of pre-service teachers different with respect to gender?
- 3) Are the critical thinking dispositions of pre-service teachers different with respect to class level?
- 4) Are the critical thinking dispositions of pre-service teachers different with respect to department?
- 5) Is there a relationship between academic achievement and the critical thinking dispositions of pre-service teachers?

## METHODOLOGY

This study used the survey model, which, as Karasar (2006) has indicated, is used to describe the situation as it currently exists. The purpose of a survey research is gathering beliefs, opinions or perceptions about a present issue from a large group (Lodico et al., 2010). This study was conducted by the researcher and took nearly six months.

### Participants

Convenience sampling model was used to choose samples. It is used when researchers want to work with individuals who are available, convenience and willing to participate (McMillen, 2008; Cohen and Manion, 1994; Gay et al., 2009). Although this type of sampling has some limitations to generalize the result to a population, researchers are obligated to use it due to practical limitations (Johnson and Christensen, 2012). In this study to block researchers' bias and to enhance generalizability, some precautions were taken by researcher. For example, while the sample was formed, strata (departments, class level etc) were taken into consideration. Students' proportion for every department in the chosen university were tried to get near the sample. Participants were randomly selected from their strata. The study group consisted of 1106 out of a total of 2932 pre-service teachers. Participants in the study group were chosen from eleven different departments of the Faculty of Education at Mehmet Akif Ersoy University (Table1).

As seen in Table 1, the distribution of pre-service teacher varies between 4.3 and 22.7% with respect to the departments. Overall, the number of pre-service teachers in the study group represents 37.72% of the total number of pre-service teachers in the faculty. Each pre-service teacher was given a personal information form in order to describe the students in the study sample. A descriptive analysis of the data obtained from the individual information forms is given in Table 2.

According to Table 2, 59.1% of the pre-service teachers in this study's sample were females and 40.9% of the pre-service teachers were males. Of the pre-service teachers taking part in this study, 29.9% were first year, 27.2% were second year, 22.2% were third year and 20.3% were fourth year pre-service teachers.

### Data collection tools

This study employed an Individual Information Form and the Turkish version of the California Critical Thinking Disposition Inventory (CCTDI-T) as data collection instruments. The researcher prepared the Individual Information Form. This form included information such as the pre-service teachers' student ID number (to obtain their academic achievement score), department, class and gender.

California Critical Thinking Disposition Inventory (CCTDI) scale emerged in 1990 as a result of the Delphi Project organized by American Philosophical Association. The original scale has seven sub-dimensions. However, the scoring system consisted of summing the scales to identify the critical thinking disposition. These sub-scales were not used for separate evaluations in this study, but these original dimensions have been described below to make it more comprehensible overall. The dimensions of the scale are: truth seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness and maturity (Kökdemir, 2003).

1. Truth seeking sub-scale: This sub-scale measures the tendency to evaluate different alternatives or different thoughts. A high score on this scale indicates that a person is skilled in asking questions, tends to seek the truth, and is able to behave objectively even when faced with data that contradict their own thoughts.
2. Open-mindedness sub-scale: Open-mindedness means that a person is tolerant toward different approaches and is sensitive to his/her own mistakes. An open-minded person pays attention not only to his/her own thoughts but also to the opinions and thoughts of others.
3. Analyticity sub-scale: Analyticity means being careful in situations that can potentially cause problems and exhibiting the tendency to use objective proofs and reasoning for difficult problems.
4. Systematicity sub-scale: Systematicity is the tendency toward planned, careful and organized research. It means using a decision-making strategy that follows a specific procedure that is knowledge-based instead of using chaotic reasoning.
5. Self-confidence sub-scale: Self-confidence, as is evident from its name, indicates the trust that a person has in his/her own reasoning processes.
6. Inquisitiveness sub-scale: Inquisitiveness or intellectual inquisitiveness reflects the disposition toward learning new things and obtaining information without expecting any profit or benefit.
7. Maturity sub-scale: Maturity is defined as mental maturity and cognitive development. It is assumed that higher scores on this scale indicate a higher level of maturity.

What makes CCTDI different from similar critical thinking disposition scales is that CCTDI is used to evaluate an individual's critical thinking disposition, not to measure a skill. This scale, in its original form, is a six-point Likert scale (strongly disagree, disagree, partly disagree, partly agree, agree, strongly agree) that is composed of 75 items. Kökdemir translated it to Turkish, and after validity and reliability analysis, 24 items were removed and the scale was reduced to 51 items. When the factors in the CCTDI-T scale (the Turkish version of CCTDI that was reduced to 51 items) and the items associated with these factors are analyzed, it is clear that the underlying structure is not much different from the original scale. However, it is apparent that some items were switched between the factors and that two factors (open-mindedness and maturity) were combined. The internal consistency coefficient (alpha) of the new scale, which consists of 6 dimensions (truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, and inquisitiveness) and 51 items, was found to be .88 (Kökdemir, 2003). Because the original scale consists of 7 dimensions, Facione et al. (1998, cited by: Kökdemir, 2003) stated that these values are 280 (40 x 7) and 350 (50 x 7), respectively. To determine the disposition toward critical thinking, this present study used a score that was the sum

**Table 1.** Distribution of pre-service teachers in the sample with respect to their departments.

Department	Total no of pre-service teachers	% in faculty	No of participants in the study	% in sample	% in total
Mathematics Education (1)	136	5	63	5,7	46.32
Science Education (2)	205	7	82	7,4	40
Social Studies Teacher Education (3)	389	13	159	14,4	40.87
Physical Education and Sports (4)	122	4	52	4,7	42.62
Foreign Language Teaching (5)	163	6	69	6,2	42.33
Turkish Language Teaching (6)	363	12	129	11,7	35.54
Early Childhood Teacher Education (7)	292	10	116	10,5	39.73
Elementary Teacher Education (8)	784	27	251	22,7	32.02
Art Teacher Education (9)	233	8	86	7,8	36.91
Music Education (10)	127	4	51	4,6	40.16
Computer and Instructional Technologies Teaching (11)	118	4	48	4,3	40.68
Total	2932	100	1106	100	37.72

**Table 2.** Descriptive analysis of the distribution of the pre-service teachers' gender and class level.

Demographic characteristics	F	%
<b>Gender</b>		
Females	654	59.1
Males	452	40.9
Total	1106	100
<b>Class level</b>		
1st	331	29.9
2nd	306	27.7
3rd	245	22.2
4th	224	20.3
Total	1106	100

of the scores taken from the sub-dimensions. When CCTDI-T is evaluated as a whole it could be stated that the overall critical thinking disposition of persons having scores less than 240 (40x6) is low, while the critical thinking disposition of persons having scores over 300 (50x6) is high (Kökdemir, 2003). The reliability of the scale for this study was calculated at .82. Accordingly, the scale is highly reliable (Tavşancıl, 2002). Permission to use the scale was obtained from Kökdemir by e-mail.

#### Data analysis

The first step was to examine whether or not the statistic techniques to be used for data analysis conformed to the assumptions. For normal distribution, which is a basic assumption for any parametric statistic technique, skewness-kurtosis, q-q plot and histogram graphs were examined. According to these graphs and values, each measurement showed normal distribution, except the distribution of gender (for boys). Gravetter and Wallnau (2004) say

that if the number of sample is greater than thirty ( $n > 30$ ), this assumption can be ignored.

For the first research question, descriptive analysis was employed. For the second research question, the independent samples t-test was applied. The independent samples t-test is used to compare the mean scores of two different groups (Pallant, 2001). Analysis of Variance (ANOVA) was used for the third and fourth research questions. ANOVA (analysis of variance) is used to compare the variances of different groups. It has two superiorities over the t-test. First of all, the t-test can only be used for two groups at most, while ANOVA can be used to compare two or more groups. Secondly, the researcher chooses a value to test each hypothesis. This  $\alpha$  value determines how many Type 1 errors we make. The possibility of making an error increases as the number of hypotheses that are tested increase. ANOVA prevents the increase of experimental error by collecting all comparisons in one hypothesis (Gravetter and Wallnau, 2004). The LSD Test was used as post hoc test. Correlation analysis was used for the fifth research question. Correlation analysis is a statistical method that is used to test the relationship of one variable to other variable(s) and if there is a relationship, then it is used to determine the level of the relationship (Kalaycı, 2006). In this study, the significance level was taken to be 0.01. Because in third sub-question according to levene test it was violated the homogeneity of variance assumption. Tabachnick and Fidell (2007:p. 86) suggest an alpha lower than conventional .05. Additionally to take .01 as significance level provides to minimize the Type 1 error (Johnson and Christensen, 2012).

#### FINDINGS

This section presents the findings of the data analysis that was conducted to identify the critical thinking dispositions of pre-service teachers in terms of different variables. The results of this descriptive analysis, which was carried out to determine the overall critical thinking dispositions of pre-service teachers, are given in Table 3.

Table 3 shows that the scores of 1106 pre-service teachers in the CCTDI-T varied from 141 to 315. The average CCTDI-T score was  $X = 220.71$  and  $SD = 21.23$

**Table 3.** Descriptive findings of pre-service teachers' CCTDI-T scores.

	N	Min	Max	$\bar{X}$	SD
CCTDI-T	1106	141	315	220.71	21.23
N	1106				

**Table 4.** T-test results for critical thinking dispositions of pre-service teachers with respect to gender.

Group	N	$\bar{X}$	SD	t	df	P
Females	654	221.80	20.99	2.052	1104	.04*
Males	452	219.13	21.50			

\* $p > .01$ .

. This indicates that the critical thinking dispositions of pre-service teachers are low.

Gender is one variable that may be related to a person's critical thinking disposition. Table 4 shows the results of the independent-samples t-test, which was performed to determine how pre-service teachers' critical thinking dispositions varied with respect to gender.

As it shown in Table 4, there is no significant difference between the CCTDI-T score averages of females ( $X=221.80$ ,  $SD=20.99$ ) and males ( $X=219.13$ ,  $SD=21.40$ ;  $t(1104)=2.052$ ,  $p=.04$ ) ( $p > .01$ ). In other words, gender does not have a significant effect on a person's critical thinking disposition. Furthermore, it was determined that the size of its effect was small ( $0.004 < 0.01$ ).

Class level is another variable that can affect the disposition toward critical thinking. Table 5 shows the results of the ANOVA test, which was performed to determine how the critical thinking dispositions of pre-service teachers varied with respect to class level.

As seen in Table 5, analysis of variance did not reveal a significant difference between critical thinking test scores with respect to class level ( $F_{3-1102}=2.02$ ;  $p > .01$ ;  $\eta^2=.005$ ). Furthermore, it was determined that the size of effect ( $.005 < .06$ ) and power ( $.52 < .80$ ) of the test were small. This shows that class level does not have a significant effect on critical thinking test scores.

Department is another variable that can effect a person's critical thinking disposition. Table 6 shows the results of ANOVA, which was performed to determine the how critical thinking dispositions varied with respect to department.

Table 6 presents that analysis of variance revealed a significant difference between the test scores for critical thinking dispositions with respect to departments ( $F_{10-1095}=3.14$ ;  $p < .01$ ;  $\eta^2=.03$ ). Also, it was found that test's size of effect was small ( $.03 < .06$ ) but its power was high ( $.99 > .80$ ). To find the source of department-related difference, the LSD post hoc test was performed. The

post hoc results revealed the following:

1. The average score on the CCTDI-T (California Critical Thinking Disposition Inventory-Turkish) for the Social Studies Teacher Education Department (3) ( $X=222.94$ ,  $SD=22.50$ ) was significantly different from the average CCTDI-T score for the Music Education Department (10) ( $X=211.59$ ,  $SD=15.68$ ).
2. The average score on the CCTDI-T for the English Language Teaching Department (5) ( $X=228.26$ ,  $SD=19.61$ ) was significantly different from the average CCTDI-T score for the Turkish Language Teaching Department (6) ( $X=217.50$ ,  $SD=23.95$ ), the Art Teacher Education Department (9) ( $X=218.72$ ,  $SD=22.18$ ) and the Music Education Department (10) ( $X=211.59$ ,  $SD=15.68$ ).
3. The average score on the CCTDI-T for the Turkish Language Teaching Department (6) ( $X=217.50$ ,  $SD=23.95$ ) was significantly different from the average CCTDI-T score for the Early Childhood Teacher Education Department (7) ( $X=224.46$ ,  $SD=21.86$ ).
4. The average score on the CCTDI-T for the Early Childhood Teacher Education Department (7) ( $X=224.46$ ,  $SD=21.86$ ) was significantly different from the average CCTDI-T score for the Music Education Department (10) ( $X=211.59$ ,  $SD=15.68$ ).
5. The average score on the CCTDI-T for the Music Education Department (10) ( $X=211.59$ ,  $SD=15.68$ ) was significantly different from the average CCTDI-T score for the Computer and Instructional Technologies Teaching Department (11) ( $X=223.48$ ,  $SD=16.46$ ).

In short, the critical thinking test scores differed significantly with respect to the pre-service teachers' departments.

Academic achievement was considered as another variable that could be related to the disposition toward critical thinking. Table 7 shows the results of the correlation analysis, which was performed to determine the relation between pre-service teachers' critical thinking dispositions and their academic achievement.

As it apparent from Table 7, there is a very weak positive relationship ( $r=.12$ ,  $N=1106$ ,  $p < .01$ ) between pre-service teachers' AAA and CCTDI-T scores. This indicates that there is a significant relationship between academic achievement and the disposition of pre-service teachers toward critical thinking. In other words, the higher academic achievement provides the higher critical thinking dispositions.

## DISCUSSION

One of this study's findings was that pre-service teachers' critical thinking dispositions were low. Similar results have been reported in the literature (Yim et al., 2000; Türnüklü and Yeşildere, 2005; Yenice, 2012; Yücel et al., 2012; Batanieh and Zghoul, 2006; Biber et al., 2013; Sağlam, 2013). For example, when Türnüklü and

**Table 5.** ANOVA test results of pre-service teachers' critical thinking disposition scores with respect to class level.

Source of variance	Sum of squares	Df	Mean squares	F	p
Between Groups	2723.19	3	907.73	2.02	.11 <sup>†</sup>
Within Groups (error)	495461.06	1102	449.60		
Total	498184.25	1105			

<sup>†</sup>p>.01.

**Table 6.** ANOVA results of pre-service teachers' critical thinking dispositions with respect to department.

Source of Variance	Sum of Squares	df	Mean Square	F	p	LSD (p<.01)
Between Groups	13895.35	10	1389.53	3.14	.001 <sup>†</sup>	3-10 5-6 5-9 5-10 6-7 7-10 10-11
Within Groups (error)	484288.9	1095	442.27			
Total	498184.25	1105				

<sup>†</sup>p<.01.

**Table 7.** Correlation results for the academic achievement average (AAA) and CCTDI-T scores of pre-service teachers.

		AAA	CCTDI-T
AAA	Pearson Correlation	1	.120
	Sig. (2-tailed)		.000*
	N	1106	1106
CCTDI-T	Pearson Correlation	.120	1
	Sig. (2-tailed)	.000*	
	N	1106	1106

<sup>†</sup>p<.01.

Yeşildere (2005) conducted research to investigate the critical thinking dispositions and skills of pre-service teachers, they found out that the critical thinking levels of pre-service teachers from the primary school mathematics department were not very high but that the critical thinking dispositions of the pre-service teachers were still positive. In a study conducted with 330 pre-service teachers, Yenice (2012) stated that the critical thinking dispositions of pre-service teachers were low based on their scores (<240). Yücel and Ok (2012) studied the effect of education-based critical thinking on academic achievement and critical thinking dispositions, determining

that the total average critical thinking disposition score was below 240 before and after the experiment. This indicated that the critical thinking dispositions of pre-service teachers from both groups (experiment and control groups) were low. There are also some studies about critical thinking dispositions in different disciplines. For example in Ojewole and Thompson (2014)'s study in which 509 nursing students were participants, the results showed that nursing students had overall low positive dispositions. Şengül and Üstündağ (2009) reported that 80 physics teachers have low critical thinking dispositions.

Gender is one of the variables that researchers dealing with critical thinking take into consideration. In the present study, it was determined that gender had no significant effect on the disposition toward critical thinking. This is supported by the gender-related findings of researchers such as Yim et al. (2000), Laird (2005), Ben-Chaim et al. (2000), Walsh and Hardy (1999), Biber et al. (2013), Yenice (2012), Küçük and Uzun (2013), Tümkaya (2011). For example, in a study conducted with 122 university students from the first, second and third years of a nursing program, no significant difference was found between girls' and boys' mean scores after analyzing the effect of gender on the disposition toward critical thinking (Yim et al., 2000). As the result of a study conducted by Laird (2005) with 289 students from Michigan University to determine the effect of diversity on academic self-confidence, social representation and

critical thinking disposition, it was determined that there was no significant difference in CCTDI scores between groups in terms of gender. In a study conducted by Ben-Chaim et al. (2000) with 558 eleventh grade students from seven schools of three different types (city center, rural and technical school), the authors found that although girls had higher mean scores than boys, there was no significant difference between the two groups. Yenice (2012), Biber et al. (2013) and Küçük and Uzun (2013) are yet another researchers who did not find any significant difference regarding gender in the critical thinking dispositions of pre-service teachers on the basis of total score.

Class level is another variable whose effect on critical thinking has been studied. The findings revealed that class level had no significant effect on critical thinking. In a study conducted on first, second, third and fourth year students in the nursing program of a university in Canada, Profetto-Mcgrath (2003) found no significant difference in total CCTDI scores with regard to students' class level. Laird (2005) determined that when CCTDI scores of students from Michigan University were evaluated, there was no significant difference between the groups in terms of class level. In Lederer (2007)'s study, results indicate that there was no statistically differences in critical thinking dispositions according to the level in the program. Biber et al. (2013), Küçük and Uzun (2013) and Tümkaya (2011) are another researchers who found that grade has not any significantly effect on critical dispositions of pre-service teachers.

Department is another variable whose effects on critical thinking have been studied. Here, studies have shown that the student's department does have an effect on their critical thinking dispositions. When Walsh and Hardy (1999) conducted research on students from both applied fields (nursing, education, economy) and non-applied fields (English, history, psychology), they found that students studying in the English, psychology and nursing departments had high scores. In a study conducted on 486 students to compare critical thinking dispositions of university students, Eigenberger et al. (2001) found that students from the Art and Sciences and Traditional Social Science faculties had a higher disposition toward critical thinking when compared with students from the Education and Applied Social and Health Science faculties. Furthermore, when three different levels (elementary, secondary and special education) at the Education Faculty were compared, it was ascertained that while there was no significant difference between the scores of teacher candidates from secondary education and teacher candidates from special education, there was a highly significant difference between scores of teacher candidates from secondary education and elementary education.

The present study used academic achievement scores of pre-service teachers as a base, finding a weak but

positive relationship between academic achievement and the disposition toward critical thinking. Limited studies were found that investigated the relationship between academic achievement and critical thinking disposition in terms of academic achievement scores in literature. Tümkaya (2011)'s study is one of them. In Tümkaya (2011)'s study there was found a significant correlation between academic achievement and critical thinking dispositions. Akbıyık and Seferoğlu (2006)'s study is another one. They reported that pre-service teachers who have high level critical thinking dispositions were more successful than the others who have got low level critical thinking dispositions. However, there are a few studies that shed light on academic achievement indirectly when we consider the aspects of variables such as educational background (secondary school, high school, university, etc.), scores obtained from international projects such as PISA, and the location where the student lives (rural, city center, developed or underdeveloped country, etc.). Korkmaz and Yeşil (2009) found that education received in secondary school had a negative effect on the students' critical thinking dispositions and levels. In a study carried out with 384 students from the nursing departments of two universities in Hong Kong in which the CCTDI scale was used, it was determined that there was a significant difference between the two groups in terms of scores obtained from both the total CCTDI scores and its sub-scales (Tiwari et al., 2003). In a study conducted with 588 eleventh grade students educated in seven schools of three different types (rural, city center and technical school), Ben-Chaim et al. (2000) found that with regard to school types, the average scores of students being educated at rural schools were significantly different from the average scores of students being educated in city centers. With regard to their level of scientific knowledge, the average scores of students taking more science and mathematics courses were significantly different from those who were not taking as many of these courses.

## Conclusion

Education, which is one of the most important factors in national development, needs to have changes implemented in keeping with the transition from the industrial era to the information era. The key to achieving these changes is for students to learn rational and critical thinking, which is a key to a nation's development, and to implement education reform (Aybek, 2006). Both national governments and employers discuss the fact that all sectors of the economy need the education system to produce people who can think clearly. No matter which level or discipline of education we are talking about, people should be encouraged to think more intelligently than in the past. This is because national development depends on the educational system and because

economic competition and the speed of globalization are constantly increasing (Pithers and Soden, 2000).

The goal of this study was to research the critical thinking dispositions of pre-service teachers in terms of different variables such as gender, class level, department and academic achievement. This study found that the level of critical thinking of pre-service teachers is low overall, that the department has a significant effect on critical thinking disposition, that class level and gender do not have a significant effect on critical thinking disposition, and that there is a weak and positive relationship between academic achievement and critical thinking disposition. The reason that the department has a significant effect on critical thinking disposition may be because each department has different curriculum. When they are reviewed, it is seemed that the curriculum includes different courses. For example at the Foreign Language Teaching Programme in which the participants have highest scores, some courses about communication skills attract the attention; whereas at the Music Education Programme in which the participants have the lowest scores, there are not any courses about communication skills. Furthermore, there is a weak but positive relationship between academic achievement and critical thinking dispositions. In other words, we can conclude that education and achievement are related to a person's disposition toward critical thinking. This study shows that the critical thinking skill level of pre-service teachers can be improved by education.

Strengthening students' critical thinking skills continues to be the most important goal of higher education (McBride and Reed, 1998). Although many recommendations have been made that stress the importance of critical thinking and talk about what is needed to improve this skill, they are based on theoretical knowledge and are for the most part not employed in the curriculum (Kromney and Reed, 2001). Teachers are one of the most important cogs in the educational system, which itself determines what kind of people will run a country in the future. Teacher training programs should include applied courses that reinforce critical thinking skills so that this knowledge is not just theoretical. If we want students as highly critical thinker, firstly we have to train pre-service teachers who have highly critical thinking dispositions. Level of teachers' critical thinking disposition affects critical thinking activities used by them in their class (Şengül and Üstündağ, 2009).

This study, which was carried out to examine the critical thinking dispositions of pre-service teachers in terms of different variables (gender, class, department and academic achievement), will have the following benefits:

- 1) By identifying the critical thinking dispositions of pre-service teachers, it is possible to discuss how effective the education system is in producing people with critical thinking skills.
- 2) Any discipline that deals with the education of pre-

service teachers can benefit from information about how the critical thinking dispositions of pre-service teachers are affected by different variables.

Based on the results of this study, the following recommendations can be proposed to researchers: a) There are many studies that indicate that critical thinking dispositions can be changed through education. To make future teachers think critically, courses that are considered to contribute to critical thinking could be added to department programs. For example to enrich the courses based on communication skills can be useful in education faculties. b) Interviews could be conducted with pre-service teachers in order to support this study with qualitative data. c) The critical thinking dispositions of pre-service teachers could be analyzed in terms of different variables (economic, social, culture, etc.).

### Conflict of Interests

The author has not declared any conflict of interests.

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