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The Effect of Critical Thinking Dispositions on Students Achievement in Selection and Placement Exam for University in Turkey

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ABSTRACT

The purpose of this study is to investigate the difference between academic achievement in "Selection and Placement Exam for University" (OSS) of students who have high critical thinking dispositions and of students who have low critical thinking disposition and whether this difference change with students' gender, class levels (high-school graduated /high school student) and major which they studied in high school. The research was conducted with 121 students who were selected randomly and studying to prepare 2009-OSS in the province center of Kdz. Eregli. For determining the academic achievement, scores of students on test exams for OSS in 2008-2009 academic years have been used. To measure the students' critical thinking dispositions, the "Critical Thinking Dispositions Scale" (CTDS) developed by Akbıyık in 2002 was used and this scale has the Cronbach Alpha reliability coefficient of .87. According to their scores on the CTDS, students were grouped as two sub-groups. Students who have high critical thinking dispositions were included in the first group and students who have low critical thinking dispositions were included in the second group. Whether the difference of average academic achievement scores of students' on tests for OSS change according to the first and second groups have been examined using by independent "t" test technique. Furthermore, whether or not there is a relationship between the students' critical thinking dispositions and their academic achievement in the first and second groups have been examined by using Pearson correlation technique. As a result of this study, there is no statistically significant difference between students' academic achievement and critical thinking dispositions at level of .01 and also students' critical thinking dispositions do not change with students' gender, class levels (high-school graduated /high school student) and major which they studied in high school.

Key Words: Academic Achievement; Critical Thinking Skills; Critical Thinking Dispositions; Selection and Placement Exam for University.

INTRODUCTION

In the world and especially in Turkey, one of the most important problems encountered in education is entrance to higher education. In Turkey, the quota of programs in the universities are less than the number of students in high schools and also to determine successful students among these candidates from high schools is essential so for the university entrance the OSS is compulsory due to above reasons (Azar, 2006). Approximately 1.5

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million people apply to the OSS prerequisite for entry to higher education institutions in our country each year but one out of five of these students can be accepted for First Cycle or Short Cycle degree programs.

In Turkey, by Student Placement Center (OSYM) the OSS were administered as a single-stage between the years 1974-1980, as two stages between the years 1981-1998 and as a single-stage between the years 1999-2009 and beginning from 2010 it will be administered again as two stages.

In primary and secondary education, since there is no guidance in accordance with the skills and abilities of students to professions and professional education for students, the number of students who pass the OSS in accordance with their own abilities is very low. Furthermore, students in secondary schools are classified only in terms of their skills as numerical, verbal and overall and when they enter to the OSS, they prefer to choose one of these fields as compulsory. Because the insight of education in Turkey is more suitable with the Sperman's intelligence definition, secondary education curriculum with its measurement and evaluation approaches in Turkey consider academic achievement as only according to general abilities of students and unfortunately ignore special abilities of persons and the development of special abilities are seen as responsibility of person himself by this curriculum. In other words, if students do not have abilities or skills, there is nothing to be done through education (Özden, 2003). According to Bloom et al., (1971) purpose of measurement in education is generally considered as selection of skillful students, and the most important task of measurement and evaluation process in education is to supply students with lifelong learning abilities.

Today despite many criticisms about the OSS, when our country's conditions are taken into consideration, it can be seen that there are no alternatives exams in terms of the OSS in Turkey. In this context, to determine which students' abilities are measured by the OSS will be useful for our education system. Baykul (1989) stated that the OSS should measure not only the academic achievement of high school students effectively but also the knowledge and critical thinking skills aimed in secondary education curriculum.

It has been stated that the questions in the "Selection and Placement Exam for Secondary Education Institutions" (SBS) and the OSS measure the knowledge of students at the knowledge and comprehension level and these questions ignore students' interests, abilities and values (Şahin, 2007). This situation points out that questions asked in central exams (SBS, OSS) are inefficient in terms of measuring problem solving, critical thinking, and creative thinking and so on skills that require students' higher order thinking. It has been indicated by many researches that the OSS questions measure much lower level cognitive skills of students' (Azar, 2006; Çepni, Özsevgeç, Bacanak, & Gökdere, 2001; Çepni, Özsevgeç, & Gökdere, 2003).

In addition to many purposes of examinations, there are characteristics of espousing the students' scientifically thinking skills and also giving the guidance to students for scientific works. Students' critical thinking skills can be developed through their scientific process skills (Koray, Bahadır, & Geçkin, 2006).

Critical thinking is one of the important elements of scientific thinking. Critical thinking is active and organized mental process that realize our own thinking as considering the others thinking out of us, practice what we have learned, aim to understand events, circumstances in our environment. There are five basic characteristics of critical thinking. The first one is that critical thinking requires to be active, the other one is that critical thinking requires to be independent, another one is that critical thinking requires to be open-mindedness to new ideas, more over critical thinking requires to consider the proofs and reasons advocating the thinking, the last one is that critical thinking requires the organization (Özden, 2003, pp. 158).

As considered that the universities are science and research centers, student's specific abilities that reflect the expected behaviors in this process is required. Critical thinking skills are very popular cognitive skills in science education in the recent years. Because understanding knowledge and creating relationship by analyzing this knowledge and producing new and different knowledge from the existing knowledge; that is, synthesis skills are related to critical thinking. In traditional education approaches, it is accepted that all students have the same competencies, not considering to the students' abilities and skills (Yaman & Yalcın, 2005). This situation prevents the improvement of the students' creative thinking, critical thinking, problem solving, exploring and so forth skills (Dahlgren, Castensson, & Dahlgren, 1998; Ngeow & Kong, 2001). Besides, inquiry based learning approach further develops students' critical thinking levels (Calıskan, 2009). Creative and critical thinking exposed in individuals as higher thinking skills and are seen in analysis, synthesis and evaluation steps of Bloom's cognitive domain taxonomy (Bloom, 1956). Some researchers who express that Bloom's taxonomy is not enough to expose some skills of students like critical thinking, thus new classifications are required for the goals of education (Marzano & Kendall, 2006; Paul, 1985). The common point of all of these studies is that critical thinking skills absolutely must be acquired in lifelong learning process.

Critical thinking was derived from the Greek "kritiktos" as a word origin, and passed to Latin as "criticus", and spreaded out to other languages from this. Critical thinking, whose beginning dates back to Sokrates, generally can be described as an organized and functional process which is realized to understand our own thoughts and opinions of others and improve our ability of explaining thoughts (Kaya, 1998). Critical thinking is a logical, skeptical, valid and reflective form of thinking that is based on solving problems. Critical thinking according to Allegretti and Frederick (1995); a) to evaluate other people's claims, b) one's gaining confidence his/her own claim and to asses that, c) to resolve inconsistencies and d) to understand complex problems and find solutions to these emphasizes having such those functions.

Critical thinking is an effective and organized mental process that purposes to understand the events that occur around the person's himself/herself and environment by keeping in mind the thought processes of others and applying what he/she has learned as being aware of his/her own thinking processes (Cüceoğlu, 1995). Critical thinking is disposition for thinking (Siegel, 1999). Disposition of thinking critically, as an aspect of our personality, is thought as an approach of determining and solving problems by using reasoning. Individuals should follow an active and regular mental process by being aware of their own thinking processes and also taking other people's thinking processes into account in this process (Cüceloğlu, 1993).

In the traditional understanding of education, it is one of the necessities of contemporary education that students, who are grown up as passive receivers of knowledge can separate the right information, be critical and selective in the opposite of information diversity. It is necessary to teach critical thinking skills at all stages of education to meet these requirements (Alkaya, 2006). Critical thinking is to find the meaning of information and to decide whether this information is to be accepted or rejected (Ennis, 1962).

It is an important issue that the contents of exams which are of importance step for students conform in what level to modern conceptions in our country in which the traditional educational environments are dominant. It has been analyzed that the university entrance exams discussed in this research has been successful to what extend in measuring students' critical thinking skills. It has been examined in this study encloses only a dimension that central exams as a topic which are not explicate too much bring in what academic achievement difference between students who have higher critical thinking dispositions and students who have lower critical thinking dispositions in OSS test exams according to the variables of gender and class level (high-school graduated /high school student). In addition, the relationship between students' critical thinking dispositions and their academic achievements also was strived to be determined in the study. In this context, the answers of the following questions have been pursued:

1. Is there a relationship between the academic achievements in the OSS test exams and the critical thinking dispositions of the students who have higher critical thinking dispositions and students who have lower critical thinking dispositions?

2. Is there a difference between the academic achievements of the students on the OSS test exams who have higher critical thinking dispositions and students who have lower critical thinking dispositions?

3. Are the academic achievements of students on the OSS test exams who have higher critical thinking dispositions different from the academic achievements of students who have lower thinking dispositions according to gender?

4. Are the academic achievements of students on the OSS test exams who have higher critical thinking dispositions different from the academic achievements of students who have lower thinking dispositions according to class level (high-school graduated /high school student)?

5. Are the academic achievements of students on the OSS test exams who have higher critical thinking dispositions different from the academic achievements of students who have lower thinking dispositions according to major which they studied in high school?

METHODOLOGY

This study is a descriptive work which tends to analyze the academic achievement differences on the test exams for the 2009-OSS between the students who have higher critical thinking dispositions and the students who have lower critical thinking dispositions.

a) Sample

The sample of this study were 121 students who were selected randomly and studying to prepare 2009-OSS in the province center of Kdz. Eregli 45.5% and 54.5% of the study group is composed of female and male students, respectively. The 2009-OSS test exam scores that students in the study group took are as follows: the min. and max. scores taken from 2009-OSS Test Exam-1 are 137.34 and 250.03, respectively; the min. and max. scores taken from 2009-OSS Test Exam-2 are 132.14 and 244.96, respectively.

The study group was divided into two groups as high (upper group) and low (lower group) according to the scores taken from the CTDS. There are 64 students in the lower group and 57 students in the upper group. When the mean scores of the group's critical thinking dispositions are analyzed, it is found that the whole, the lower, and the upper groups got scores of 74.652, 70.562, and 79.245, respectively.

b) Measuring Instruments

30-item Likert-type the CTDS developed by Akbiyik (2004) in order to determine students' critical thinking dispositions were used in the research. The CTDS includes more items about the information of affective domain since it is used to determine opinions and attitudes (As cited in Akbiyik, 2002). Cronbach Alpha internal consistency reliability coefficient of the CTDS was determined to be 0.87. Some of the questions in the CTDS have positive and some of them have negative origin. The options of the CTDS were rated as "Completely Agree", "Agree", "Undecided", "Disagree", and "Completely Disagree". When the data values collected from the students were being entered, the positive origin questions answered by the students were rated between 1-5, and the negative origin questions answered by the students were rated between 5-1. Another measurement instrument used in the study

was the 2009-OSS test exam that is applied by "private schools offering specialized courses" and is composed of the questions which were taken from the former OSS exams.

c) Data Analysis

The data obtained were transferred SPSS 13.00 package program. After the analysis done, t-test and Pearson moment's correlation analysis were used for the independent groups in the comparisons between groups according to arithmetic means and standard deviations and the statistical significance level was taken as p < .01.

FINDINGS

In this section, there are findings obtained from the analyses of the data obtained from the administration of "CTDS, 2009-OSS Test Exam-1 and 2009-OSS Test Exam-2" by using statistical techniques about each sub-problem.

For the first sub-problem of the study (is there a relationship between academic achievements in the OSS test exams and critical thinking dispositions of the students who have higher critical thinking dispositions and who have lower critical thinking dispositions?) statistical data are given in Table 1.

Table 1. The level of the relationship between the academic achievements of the students on the OSS test exams who have higher critical thinking dispositions and who have lower critical thinking dispositions in the OSS

Variable	CTDS(Upper Group)	CTDS(Lower Group)	Average of OSS test exams
CTDS (Upper Group)	1	,742**	-,041
CTDS (Lower Group)	,742**	-0,55	1
Academic Achievements	-,041	,124	1
** : 01			

 $p^{**} p < .01.$

According to Table-1, it is determined that there is not a significant relationship between the academic achievements in the OSS test exams and critical thinking dispositions of the students who have higher critical thinking dispositions scores (CTDS-Upper) and of the students who have lower critical thinking dispositions scores (CTDS-Lower) ($r_{upper}(63) = .041$, p > .01; $r_{lower}(58) = .055$, p > .01).

The statistical results relating to the second sub-problem of the research (Is there a difference between the academic achievements of the students on the OSS test exams who have higher critical thinking dispositions and students who have lower critical thinking dispositions?) are given in Table 2.

Table 2. The comparison of the averages of the OSS academic achievement test scores between the group who have higher critical thinking dispositions and the group who have lower critical thinking dispositions

Group	\overline{X}	S_d	n	$\overline{X}u$ - $\overline{X}l$	t
Academic Achievement (Upper Group)	185.92	119	63	0,72	0,165
Academic Achievement (Lower Group)	185.20		58		

The data in Table 2 point out that there is not a significant difference between the academic achievements of the students on the OSS test exams who have higher critical

thinking dispositions and the students who have lower critical thinking dispositions t(121) = .165, p = .869). According to the data in Table 2, the scores that the students who have higher critical thinking dispositions ($\overline{x}_{upper} = 185, 92$) got on OSS-Test exams are higher than the scores that the students who have lower critical thinking dispositions ($\overline{x}_{lower} = 185, 20$). But this result revealed that the academic achievement scores of the students on the OSS test exams who have higher critical thinking dispositions and who have lower critical thinking dispositions do not constitute a significant difference statistically. This finding also supports data in Table 1 shows the relationship between critical thinking disposition scores and academic achievements.

For the third sub-problem of the research (Are the academic achievements of students on the OSS test exams who have higher critical thinking dispositions different from the academic achievements of students who have lower thinking dispositions according to gender?) statistical results are given in Table 3.

Table 3. The comparison of academic achievement scores on the OSS test exams according to the gender between students having higher critical thinking dispositions and students having lower critical thinking dispositions

Academic Achievement	Gender	n	X upper	t
Academic Achievement (Upper Group)	Female	29	177, 52	2,683
Academic Achievement (Upper Group)	Male	34	193,08	
Academic Achievement	Gender	n	Xlower	t
Academic Achievement (Lower Group)	Female	25	190,86	1,618
Academic Achievement (Lower Group)	Male	33	180,91	

In Table 3, for female $\overline{x}_{upper} = 177$, 52 and for male $\overline{x}_{lower} = 193$, 08 are given. According to these results, it can be concluded that there is a difference among the female and male students that have high critical thinking dispositions and their OSS test exam scores, but there isn't difference among the students having low critical thinking dispositions. Female $(\overline{x}_{lower} = 190, 86)$ and male $(\overline{x}_{upper} = 180,91)$. $(t_{upper} (63) = 2,683 \ p < .01; t_{lower} (58) = 1,618 \ p > .01)$.

The statistical results given in Table 4 show the comparison emphasized in the fourth sub-problem of the research: are the academic achievements of students on the OSS test exams who have higher critical thinking dispositions different from the academic achievements of students who have lower thinking dispositions according to class level (high-school graduated /high school student)?

Table 4. The comparison of academic achievement scores of students on the OSS test exams who have higher critical thinking dispositions and students who have lower critical thinking dispositions according to class level (high-school graduated /high school student)

Academic Achievement	Class Level	n	\overline{X}_{upper}	t
Academic Achievement (Upper Group)	Graduated	41	185,52	0,178
Academic Achievement (Upper Group)	Non graduated	22	186,66	
Academic Achievement	Class Level	n	\overline{X}_{lower}	t
Academic Achievement (Lower Group)	Graduated	39	189,21	1,900
Academic Achievement (Lower Group)	Non graduated	19	176,98	

According to Table 4, for high-school graduated students $\overline{x}_{upper} = 186$, 66 and for high school students $\overline{x}_{upper} = 185,52$; for high school students $\overline{x}_{lower} = 176,98$ and for high-school

graduated students $\overline{x}_{lower} = 189,21$ according to class level among the academic achievement scores of students on the OSS test exams who have higher critical thinking dispositions and of students who have lower critical thinking dispositions. It has been indicated that there isn't significant difference among the OSS-test exam scores of students.

The statistical results given in Table 5 and Table 6 show the comparison emphasized in the fifth sub-problem of the research: are the academic achievements of students on the OSS test exams who have higher critical thinking dispositions different from the academic achievements of students who have lower thinking dispositions according to major which they studied in high school?

Table 5. The comparison of academic achievement scores of students on the OSS test exams who have higher critical thinking dispositions and students who have lower critical thinking dispositions according to major which they studied in high school?

						-		
Variable			M*	Ν	\overline{X}	Sd	Minimum	Maximum
Academic	Achievement	(Upper	1	11	201, 01	12,18	187,45	221,51
Group)			2	19	207,74	13,99	189,08	242,71
			3	27	206,71	15,51	188,60	247,50
			Total	57	205, 95	14,39	187,45	247,50
Academic	Achievement	(Lower	1	14	161, 40	14,92	141,44	183,51
group)			2	20	170, 65	11,90	144,63	185,12
			3	30	168, 09	12,80	141,84	185,75
			Total	64	167, 42	13,25	141,44	185,75

* Major which they studied in high school (M): 1) Numerical Field, 2) Verbal Field, 3) Overall Field

According to Table 5, it is seen that the academic achievement scores of students on the OSS test exams who have higher critical thinking dispositions according to major which they studied in high school, students preferring numerical field (\overline{x}_{upper} = 201,01), students preferring verbal field (\overline{x}_{upper} = 207, 74), students preferring overall field (\overline{x}_{upper} = 206, 71); the academic achievement scores of students on the OSS test exams who have lower critical thinking dispositions according to major which they studied in high school, students preferring numerical field (\overline{x}_{lower} = 161,40), students preferring verbal field (\overline{x}_{lower} = 175, 65), students preferring overall field (\overline{x}_{lower} = 168,09). It has been indicated that there isn't differences between the academic achievements of students on the OSS test exams who have higher critical thinking dispositions and students who have lower critical thinking dispositions and students who have lower critical thinking dispositions and students who have lower critical thinking dispositions according to major students who have lower critical thinking dispositions and students who have lower critical thinking dispositions and students who have lower critical thinking dispositions according to major which they studied in high school (F_{upper} (2/121)=,826, p>.01; (F *lower* (2/121) = 2,148, p>.01).

Table 6. The comparison of academic achievement scores of students on the OSS test exams who have higher critical thinking dispositions and students who have lower level critical thinking dispositions according to their major which they studied in high school

The Basis of		Sum of	S _d	Average of	F	Р
Variance		Squares		Squares		
Academic	Among groups	344,808	2	172,404	,826	,443
Achievement	In group	11267,119	54	208,650		
(Upper Group)	Total	11611,928	56			
Academic	Among groups	728,089	2	364,044	2,148	,125
Achievement	In group	10336,306	61	169,448		
(Lower group)	Total	11064,395	63			

CONCLUSION AND DISCUSSION

In this research, it has been investigated that whether there is a difference between the academic achievement of students on the OSS who have higher critical thinking dispositions and students who have lower critical thinking dispositions or not, whether this difference change according to students' gender, class level (high-school graduate /high school student) and major which they studied in high school or not through comparing with the results of national and international studies.

1. For research findings, the significant relationship between the academic achievement of group on the OSS test exams and critical thinking dispositions who has higher critical thinking dispositions and group who has lower critical thinking dispositions hasn't been observed.

2. For research findings, the statistical significant difference between the academic achievement on the OSS test exams of groups who has higher critical thinking dispositions and group who has lower critical thinking dispositions hasn't been observed. So, the academic achievement on the OSS test exams of groups who has higher critical thinking dispositions and group who has lower critical thinking dispositions are similar. This result can be explained as that the questions in the OSS are not measure students' critical thinking skills.

This result also shows consistency with the results of many national and international studies (Farley & Elmore, 1992; Money, 1998; Moss & Koziol, 1991; Öner, 1999). In these studies, it is mentioned by the researchers that critical thinking is not an efficient predictor to explain student academic achievement and there are not meaningful relationship between these variables. In a research of Lumpkin (1992), experimental approach has been used so as to develop primary students' critical thinking skills and it has been indicated at the end of this study that there is not a significant difference in terms of the achievement of students in experiment and control group. Besides these, it has been determined in some studies that there is a significant relationship between critical thinking and academic achievement (Luckett, 1991; Stewart, 2000; Yeh & Wu, 1992; Yeh, 1997). These results have shown that there are effects of many variables on the critical thinking and with these results generalization cannot be done. Although there are many studies concern critical thinking, inconsistency between these findings can be expressed that critical thinking is affected by many variables such as culture, education system, teaching practices, environment.

3. It has shown that the academic achievement on the OSS test exams of groups who has higher critical thinking dispositions does not different from group who has lower critical thinking dispositions according to gender. This result is similar with findings that emphasized that gender does not affect critical thinking dispositions and levels with the researches made by Yaman and Yalçın (2005), Kökdemir (2003), Gelen (2002) and Yeh (1997). Moreover, in a study conducted by Grant (2003), it has been mentioned that the interaction between students' genders and students' school performances does not make a difference on critical thinking skills.

Another study supporting this finding made in Israel. In the research made by Ben-Chaim, Ron and Zoller (2000), it has been identified that there is no difference between girls and boys critical thinking skills. In this research, it has been confirmed that boys' critical thinking skills are higher than girls' although it is low. Baron-Baron-Cohen (2003), studying about the basic differences in education, has mentioned that boys are more excellent than girls in logical reasoning and inductive studies because the brain structure of boys and girls is different. It has been indicated that boys' critical thinking skills are higher than girls', but this difference is not significant in a research done on college students by Özdemir (2005).

It has been identified that there is not a significant difference in terms of among these two variables whether the critical thinking skills of college students become different or not in terms of gender examined in many researches. In the same way, the researches indicated that there is not a significant relationship between students' problem solving skills and their genders (Tümkaya, Aybek & Aldağ, 2009).

Hence, it can be said that boys' logical thinking skills are higher than girls logical thinking skills due to the difference of their minds' work systems.

4. For the findings of the research, a significant difference between the academic achievements on the OSS test exams of students who has higher critical thinking dispositions and who has lower critical thinking dispositions according to class level (high-school graduated /high school student) hasn't been found. It can be said that critical thinking, one of the higher-order thinking skills, is occurred in a period of formal operations, and isn't enough to predict the achievement by itself. And also, keeping in mind that the OSS cannot measure these skills effectively, the finding of students whose ages are very close to each other have similar skills is expected. Emerged from this research in the similar with these results, it can be expressed that the questions in the OSS cannot measure critical thinking skills that are one of the students' high level thinking skills. As considered that one of the aims of new Teaching of Science and Technology curriculum is to develop critical thinking skills, it can be said that the questions measuring this skill should be placed in the contents of central exams. In the international exams (TIMSS) one of the most important reasons of low level achievement of our country (Bağcı-Kılıç, 2002, 2003) should be arisen from being asked questions for students to memorize the knowledge in both central exams and or school exams (Azar, 2005; Cepni, 2003; Cepni & Azar, 1998; Morgil & Bayan, 1996).Both Science and Technology and secondary education physic, chemistry and biology curriculums being consistent with the goals of central exams will provide important contributions to the cognitive development of students.

5. According to the findings of research, it hasn't been found significant difference between the academic achievements on the OSS test exams of students who has higher critical thinking dispositions and who has lower critical thinking dispositions according to their major which they studied in high school.

It is quite important that students' awareness of what it is expected from themselves in students becoming thinking, exploring and questioning individuals. It will be helpful that focusing on high level cognitive skills and guiding students to the activities for acquiring these skills in growing individuals internalizing knowledge instead of memorizing and using them in different situations.

The basic aim is to provide student's becoming scientifically literacy in primary education and secondary education programs have been revised in our country since 2006. One of the most important indicators of becoming scientifically literacy is to get individuals can think analytic, critical, can solve problem, have creative characteristics instead of individuals get simple knowledge and skills. However, individuals can use critical thinking in their lives efficiently are individuals have critical thinking skills and critical thinking dispositions (Seferoğlu & Akbıyık, 2006). These subjects should be considered for individuals in the text books to acquire critical thinking skills with the help of programs efficiently.

The development of measure and assessment tools basing on the thinking skills, acquiring from students make analysis, synthesis and assessment steps according to Bloom taxonomy by revising the measure and assessment tools used in our country that can be helpful for students' acquiring critical thinking skills and dispositions. Additionally, exams as measure and assessment tools (exams known as classic type, multiple choice etc.) moreover rubric assessment (criteria set) or portfolio assessment (development folder) and so on tools' usage can be effective for students to acquire critical thinking skills and dispositions.

It is identified that the critical thinking disposition and critical thinking levels of teachers are moderate; task of educational level, educational level, major, teaching experience, gender variables do not affect the critical thinking disposition and levels of teachers in the research made by Korkmaz (2009). Moreover, it has been stated that the critical thinking disposition of prospective teachers generally are low in the research made by Güven and Kürüm (2007) so as to determine the learning styles and critical thinking disposition of prospective teachers. In this context, classrooms environment need to be designed before higher education in order to make individuals to have these critical thinking skills, and those who are responsible for preparing these classroom environments need to be trained during pre-service education and/or by in-service courses.

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