CRITICAL THINKING DISPOSITIONS OF THE TURKISH TEACHER CANDIDATES

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ABSTRACT
Critical thinking can be explained as an effective, organized and functional cognitive process to understand our own thoughts and other people's opinions and to improve our dispositions to express ourselves. Critical thinking is a process and also dispositions about deciding what to do or believe logically. In addition it provides the possibility of using of their knowledge and talent. The aim of this study is to determine critical thinking dispositions of Turkish teacher candidates who are in the faculty of Education. When the findings regarding students' critical thinking dispositions are considered, critical thinking dimensions of Open-mindedness and Analyticity are the highest two. Low critical thinking dimensions are Inquisitiveness and Systematicity.

Keywords: critical thinking; thinking disposition; teacher candidates

TÜRK ÖĞRETMEN ADAYLARININ ELEŞTİREL DÜŞÜNME EĞİLİMLERİ

ÖZET
Eleştirel düşünme, kendi düşüncelerimizi ve başkalarının fikirlerini anlayabilmek ve düşünceleri açıklayabilme becerimizi geliştirmek için etkin, örgütlü ve işlevsel bir bilişsel süreç olarak tanımlanabilir. Eleştirel düşünme bir süreçtir ve neyi yapma ya da neye inanmaya mantıklı bir biçimde karar verme ile ilgili becerilerdir. Ayrıca, zekayı, bilgiyi ve yetenekleri aktif bir biçimde kullanma imkanı sağlamaktadır. Bu çalışmada; Eğitim Fakültesi programlarında öğrenim gören öğretmen adaylarının eleştirel düşünme eğilimine sahip olma düzeylerinin belirlenmesi amaçlanmıştır. Açık fikirlilik ve Analitiklik eleştirel düşünme boyutları yüksek orandadır. Düşük oranda yer alan düşünme boyutları, Meraklılık ve Sistematiklikdir.

Anahtar Sözcükler: eleştirel düşünme, düşünme eğilimi, öğretmen adayı

I. INTRODUCTION

The thinking process may be defined as transferring the objects and events of the outer world into symbols. According to this, the brain fulfills a lot of functions such as inferring meaning from symbols, establishing hypothesis, calculating and producing the upcoming symbols. Later, it transfers these symbols into objects and events of the outer world. Thus, it can successfully manage the existing "real" situation. Thinking is the term for the organized cognitive process, which is target oriented and actively done to understand the current situation. Nickerson (1987), states that thinking covers problem solving, decision- making, critical thinking, logical judgment and creative thinking. He lists the characteristics of thinking as follows: the masterly and objective use of information; stating the organized thoughts in a brief, to the point and objective manner; the disposition to differentiate logically valid and invalid results; the disposition to understand the belief degrees of thought; the disposition to see vague and unclear similarities and difference; the disposition to understand the difference of being right and winning a discussion; accepting that problems have different ways that lead to the solution, each of which has an internally valid justification; understanding the difference between hypothesis, assumptions and results; being sensitive towards the difference between the accuracy and strength of a belief; the ability to show distinctively different aspects without exaggerating, categorizing or changing. (Ellis and Hunt, 1993).

Thinking is the process of how information is presented cognitively. This presentation can be a word, a visual design, a sound or any other idea. If the aim is to guide towards a target, to answer a question or to solve a problem, the thinking activity is the transfer of a new and different way of information organization. The nature of thinking is contested and they acknowledge that the notion of "far" transfer, for instance, from one discipline domain to another, is problematic. Thinking is a disposition, can be taught directly, and it should be taught. A person's thinking dispositions and their efficiency can certainly be improved by using good thinking tools. The future of nations depends on their educating individuals who are creative, have a strong sense of judgment and can think. With regards to this, the aim of education should not only cover the t ransfer of knowledge but also the organization of high-disposition thinking strategies and their improvement . The common point in all of these definitions is that thinking is an aim-focused cognitive process that makes an individual understand events, solve problems and make decisions by using acquired information.

This tendency highlights the concept of "critical thinking", which is one of the important thinking types. Thinking is the way to perceive world. It is to think about thinking in order to be able to think critically, explain and develop thinking. If the individual can understand the cognitive processing system behind aim-focused working, decision-making and analyzing thoughts, then that individual will be able to think more effectively under those conditions.

Critical Thinking

Since the 1980s scholars claim that critical thinking contributes to the development of rational deliberation relevant to a democratic society (Lipman, 1991; Weinstein, 1991). From a philosophical point of view, critical thinking is primarily approached as the norm of good thinking, the rational aspect of human thought, and as the intellectual virtues needed to approach the world in a reasonable, fair-minded way (Gibson, 1995). Psychologists conceptualize critical thinking first and foremost as higher-order thinking dispositions and focus attention on the appropriate learning and instruction processes (Halpern, 1998; Kuhn, 1999). Lastly, the concept of critical thinking functions in 'critical pedagogy'. Critical thinking refers here to the capacity to recognize and overcome social injustice (McLaren, 1994).

One of the most famous contributors to the development of the critical thinking tradition is Robert Ennis; his definition, which has gained wide currency in the field, is: critical thinking as 'reasonable reflective thinking that is focused on deciding what to believe or do'. Critical thinking includes such acts as 'formulating hypotheses, alternative ways of viewing a problem, questions, possible solutions, and plans for investigating something'. In his definition, Ennis distinguishes between dispositions (analyzing arguments, judging credibility of sources, identifying the focus of the issue, and answering and asking clarifying and/or challenging questions) and attitudes, the so-called dispositions (be prepared to determine and maintain focus on the conclusion or question, willing to take the whole situation into account, prepared to seek and offer reasons, amenable to being well informed, willing to look for alternatives, and withholding judgement when evidence and reasons are insufficient) (Ennis, 1987; Ennis, 1991; Kennedy, Fisher and Ennis, 1991). The dispositions are an essential part of critical thinking: without being open-minded and considerate of other people and perspectives, critical thinking does not exceed 'egocentric and sociocentric thinking'(Paul, 1992).

Although most authors agree that critical thinking involves both dispositions and dispositions, in empirical, often psychological, research attention is primarily paid to the thinking dispositions. For example, Pascarella and Terenzini (1991), note that critical thinking has been defined and measured in a number of ways 'but typically involves the individual's ability to do some or all of the following: identify central issues and assumptions in an argument, recognize important relationships, make correct inferences from data, deduce conclusions from information or data provided, interpret whether conclusions are warranted on the basis of the data given, and evaluate evidence or authority' (Furedy and Furedy, 1985).

The most cited definition is provided by the American Philosophical Association. Critical thinking "is the purposeful, self-regulatory judgement which results in interpretation, analysis, evaluation and inference as well as explanation of the evidential conceptual, methodological, criteriological or contextual considerations upon which that judgement was based. Critical thinking is essential as a tool of inquiry. Critical thinking is a pervasive and self-rectifying human phenomenon" (American Philosophical Association, 1990). The "ideal critical thinker is habitually inquisitive, well-informed, honest in facing personal biases, prudent in making judgements, willing to consider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in selection of criteria, focused in inquiry and persistent in seeking results which are precise as the subject and circumstances of inquiry permit" (Facione, 1990). Simpson and Courtneay (2002), in their review of the literature on critical thinking identified the characteristics that a critical thinker may possess, these include: Open mindedness, having the ability to appreciate alternative perspectives and different opinions; being inquisitive, having a desire to investigate new things to gain knowledge and understanding; truth seeking, sufficiently inquiring to gain new insights; analytical in one's approach to critiquing evidence and the inferences that can be drawn from the evidence; uses an organised and meticulous approach to problem solving; self-confident with self awareness of own individual ability to utilize and critique available scientific evidence to inform decisions (Simpson and Courtneay, 2002). Halpern (1998), comes to the following taxonomy of critical-thinking dispositions: verbal-reasoning dispositions; argument-analysis dispositions; thinking dispositions such as hypothesis testing; thinking in terms of likelihood and uncertainty; decision-making and problem-solving dispositions.

A problem that is connected with the characterization of critical thinking as a higher-order thinking disposition is the unclear distinction between critical thinking on the one hand, and other kinds of higher-order thinking on the other. This holds true, in particular, for problem-solving and creative thinking. Hartman and Sternberg (1993) for

example, draw the line as follows: critical thinking is an application of the cognitive system people use to select between environments, whereas creative thinking is used to shape the environment. Others reserve the term 'critical' for a specific quality of higher-order cognitive dispositions or strategies as we solve a problem, we can do it more or less critically. Several authors emphasize the reflective, self-evaluative nature of critical thinking, and point out that the metacognitive dispositions needed for this should be adressed in instruction (Halpern, 1998). Paul (1992), even calls critical thinking spurious when students are not being taught standards and criteria for assessing their own thinking. For Kuhn (1999), both metacognitive dispositions, metacognitive knowledge and epistemological beliefs are crucial for critical thinking. The latter is considered to be the most important part because it influences the other components.

Scriven and Paul (1985), defined critical thinking as critical thinking is the entellectually disciplined process of actively and dispositionfully conceptualizing, applying, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, feflection, reasoning or communication, as a quide to belief and action (Paul and Elder, 2001). It also defined as "self-directed, self-disciplined, self-monitored and self-corrective thinking" or "the process of analysing, evaluating and synthesising information in order to increase our understanding and knowledge of reality". Dewey (1909), called it "reflective thinking" and defined it as: active, persistent and careful consideration of a belief or supposed form of knowledge in the light of the grounds which support it and further conclusions to which it tends (Fisher, 2001).

Glaser (1941), defined critical thinking as: an attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experience; knowledge of the methods of logical enquiry and reasoning ; and some disposition in appplying those methods. Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends. Almost everyone who has worked in the critical thinking tradition has produced a list of thinking dispositions which they see as basic to critical thinking. Glaser (1941), listed the abilities: to recognise problems; to find workable means for meeting those problems; to gather and marshal pertinent information; to recognise unstated assumptions and values; to comprehend and use language with accuracy, clarity and discrimination; to intrerpret data; to appraise evidence and evaluate statements; to recognise the existince of logical relationships between propositions; to draw warranted conclusions and generalisations; to put to test the generalisations; to put to test the generalisations and conclusions at which one arrives; to reconstruct one's patterns of beliefs on the basis of wider experience; and to render accurate judgements about specific things and qualities in everyday life (Fisher, 2001).

Thinking process are associated with making sense of large, complex and often contradictory knowledge sources. While critical thinking in all disciplines considers values and dispositions such as a commitment to reason and open discourse, thinking does not occur in a vacuum; it is thinking about something. It has been argued that critical thinking is domain specific and the content of a various subjects and/or problems determines the appropriate process of reasoning. Therefore thinking is best taught as an integral aspect of a course of studies and acquiring a deep understanding of specific content. That is, teaching of thinking must occur in concert with the teaching of content.

What can critical thinking be? Critical thinking is a well-developed, powerful way of thinking. In objective evaluation, everything is taken into consideration. We need to show valid reasons when we claim something to be real or compatible to reality. If the reason is in accordance with the view in question or more powerful than the view in question, than it is correct. Critical thinking involves discovering truth and getting rid of all views contradicting truth, personal beliefs and prejudices, thus it involves progress. This is a constant process of questionning and examining. Yet, this situation leads to new ways of information and understanding. Almost everyone agrees that one of the main goals of education, at whatever disposition, is to help develop general thinking dispositions particularly critical thinking dispositions. Almost everyone also agrees that students do not acquire these dispositions as much as they could and should. The difficult part is knowing what to do about it. Apparently, we need to generally improve our teaching and our education systems. But in what ways? What enhancements would best promote the development of critical thinking dispositions? One sensible strategy is to look to science for some guidance. The relevant scince in this case is cognitive science, he interdisciplinary science of thinking: what it is, how it works, and how it develops.

Critical thinking starts as soon as individuals establish a connection between their individual experience and social conditions. There is a direct relationship between individuals' ability to establish this connection and the education they have on this issue. The most important place to offer this education are schools and teachers trained in critical thinking. A qualified teacher is the one "who has the necessary information and dispositions required by his study area, is equipped with knowledge regarding the teaching profession, one who thinks, asks,

critisizes, is open to development and innovations." Consequently, importance should be given to the training of qualified individuals needed in today's information societies, the consideration of these in teacher training and the training of teacher candidates in accordance with these qualifications.

The dimension characteristics of the critical thinking disposition are explained as follows:
Analyticity: Analiticity expresses the tendency to be cautious towards situations that might lead to potential problems and the ability to use logic and objective evidence even under difficult problems. High scores indicate that this tendency is strong.
Open-mindedness: Open-mindedness expresses an individuals' tolerance to different approaches and the sensitivity towards own faults. The main mentality behing open-mindedness is that the individual does not only consider his own thoughts but also the thoughts and views of others while making decisions. High scores indicate that the individual is good in terms of this tendency.
Inquisitiveness: Inquisitiveness or intellectual inquisitiveness expresses the individuals' tendency to acquire and learn new things without any expectations regarding benefits. High scores mean that this tendency is also high in the individual.
Self-confidence: Self-confidence, as its name suggests, expresses the person's confidence in himself regarding his own process of thinking. High scores on this tendency reflect that the individual has high self-confidence.
Truth-seeking: This dimension measures the individual's ability to evaluate different alternatives and thoughts. A high score in this dimension shows that the individual has the skills of researching, asking questions, and being objective despite data opposing his ideas.
Systematicity: Systematicity is the tendency to make systematic, organized, planned and cautious research. It is the tendency to use strategic decision-making skills based on information and a specific procedure. (Kökdemir, 2003).

Kökdemir (2003), examined the problem solving and decision making strategies of Turkish university students under uncertainty in his study. Examining the quality and quantity of the relationship between critical thinking and decision making is another purpose of the present thesis. Finally, in this study, the effects of critical thinking training on the students' critical thinking dispositions are studied. Results showed that not for all but probability related problems, subjects those who were high in critical thinking disposition prefer more rational solutions.

Kaya (1997), aimed to find out the factors that affects the critical thinking power of the university students in his research called "Critical thinking power of university students". The research was conducted on the students who are attending the institutes. According to the research, there was a statistically significant difference between the branches and the socio economic backgrounds of the students.

Elam (2001), aimed to find out the critical thinking power of the students and their tendencies towards critical thinking amongst the students who are in the first and third grades. The research was conducted amongst the students who are attending a vocational high school. According to the research, there was a statistically significant difference between the critical thinking tendencies and the grades of the students.

In Hayran's research (2000), named "The Point of Views of the Primary School Teachers about Thinking Skills and Processes", it was aimed to find out whether teachers possess the critical thinking skills and processes according to different variables, by asking their opinions about them. In the research, it was found that teachers possess the problem solving skills and they use them in their daily lives. The gender variable is a meaningful factor.

Colucciello (1999), aimed to find out the tendencies of the nursing students towards the critical thinking and their thinking styles and test if there is a connection between these two features in the research called "The Relations Between the Critical Thinking Tendencies and Learning Styles". According to the research, it was found that, students' levels are low in self confidence, analyticity, systematicity and inquisitiveness dimensions.
In Facione, Giancarlo, Facione ve Gainen's (1995) research called "The Tendency Towards Critical Thinking", it was aimed to find out students' tendencies of critical thinking. The research was conducted on the students in two different universities. "CCTDI" was used as an inventory. In the research, it was concluded that, first grade students were found strong in open mindedness and inquisitiveness, and they were found insufficient in systematicity and truth seeking.

Kürüm (2002), aimed to determine the levels of critical thinking power of teacher candidates and the thinking skills that forms this power, and also the factors that affects critical thinking. According to the findings of this research, critical thinking power levels of the teacher candidates and the thinking skills that form this power are in the middle level. In addition, age, the high school they graduated, university exam entrance point type, the

programmes they are attending, income level and social activities are influential on candidates' thinking power and their thinking skills as different variables.

In a research that was conducted by Çıkrıkçı (1996) on university students, it was aimed to compare the female and male students' points which they got from Watson-Glaser Critical Thinking Appraisal Scale who are attending their last years in Science and Social Sciences departments. According to the findings of this research, there was not a significant difference between the students' grades on the basis of their gender and the programmes they are attending.

The aim of this study is to determine the disposition of critical thinking dispositions of the teacher candidates who are in the faculty of Education at Eskişehir Osmangazi University. For this purpose, the study aims to answer the following research questions: 1.How is the frequency distribution of teacher candidates' critical thinking dispositions? 2.Do the frequency distribution of teacher candidates' critical thinking dispositions show differences according to critical thinking dimensions? 3.Do the critical thinking dispositions of teacher candidates show differences according to the variables below? a.their gender, b.their branch, c.their grade disposition, d.type of secondary school branch.

II. METHOD

This research was designed by using descriptive research and the casual-comparative research model. The data about the critical thinking tendency disposition of the subject group which consists of the teacher candidates enrolled in 4 different programmes of various education dispositions and areas at faculty of education is based on the results of the data collection instrument (The California Critical Thinking Disposition Inventory).The study was done with 400 students enrolled at the faculty of education's Primary Education and Computer and Instructional Technologies in education programmes. Information on the subject group is demonstrated in Table 1.

The data collection instrument consists of two parts. The first part is about the subjects' personal information; the second part is the Critical Thinking Disposition Inventory, which elicits critical thinking tendencies. "Critical Thinking Disposition Inventory" was adapted to Turkish by Kökdemir (2003). The original version is "The California Critical Thinking Disposition Inventory (CCTDI)". This inventory was developed in the Delphi Project run by The American Philosophy Association in 1990. The version, which was adapted into Turkish, consists of 51 items, covering 6 dimensions. For the statements in the "Critical Thinking Disposition Inventory" a Likert-type of equal-range and six sections was used. The statements in the inventory have been labelled as; "Completely Agree (6)", "Agree (5)", "Partly Agree (4)", "Partly Disagree (3)", "Disagree (2)", "Completely Disagree (1)". In order to test the reliability of the "Critical Thinking Disposition Inventory", both as a whole and each of the six dimensions, the Cronbach Alpha Coefficients were calculated. As a whole the "Critical Thinking Disposition Inventory" has a high degree of reliabiliy ("α .89").

Table1. Information on The Subject Group

Variables	N	%
Gender		
Female	254	63.5
Male	146	36.5
Total	400	100.0
Programme		
Primary School Class Education	106	26.5
Primary School Mathematics Education	164	41.0
Primary School Science Education	104	26.0
Computer and Instructional Technologies in Education	26	6.5
Total	400	100.0
Class		
1	70	17.5
2	94	23.5
3	112	28.0
4	124	31.0
Total	400	100.0
Graduated Programme Type		
General High School	119	29.8
Science High School	11	2.8
Super High School	91	22.8
Teacher Training High School	54	13.5
Vocational High School	18	4.5
Anatolian High School	96	24.0
Private High School	06	1.5
Others	05	1.3
Total	400	100.0

Table 2. The Cronbach Alpha Coefficients of The Critical Thinking Disposition Inventory

Critical Thinking Disposition Inventory And the items		Alpha
Analyticity	(10,11,12,13,14,15,16,17,18,19)	.649
Open-mindedness	(20,21,22,23,24,25,26,27,28,29,30,31)	.853
Inquisitiveness	(1,2,3,4,5,6,7,8,9)	.780
Self-confidence	(32,33,34,35,36,37,38)	.982
Truth-seeking	(39,40,41,42,43,44,45)	.835
Systematicity	(46,47,48,49,50,51)	.448
Total (51)		.891

Table 2, shows that when Alpha coefficient evaluation value criteria are considered, "Critical Thinking Disposition Inventory" has a high degree of reliablity as a whole. In group comparisons, reliability values between .60 and .80 are acceptable. When decisions about individuals are concerned, the reliability value of the instrument needs to be above .80 (Özçelik, 1989).

In the analysis of the data, besides descriptive statistical techniques such as arithmetical average and standard deviation, parametric statistical techniques such as "t-test for Independent Two-group, equal variance" for the comparisons of the two groups, and 'One-way Variance Analysis (ANOVA) for more than two group comparisons were used. In cases where "F-test" results at the end of variance analysis were statistically meaningful, "Tukey HSD" test was done to determine the source for difference. In all statistical analysis, the significance disposition was taken as .05.

III. FINDINGS

The Distribution of Teacher Candidates' Critical Thinking Dispositions

The first question to be answered requires determining the critical thinking dispositions of the students. Firstly, the styles' arithmetical averages and standard deviations were calculated in order to get an idea of the sample group's critical thinking dispositions. The results are shown in Table 3.

Tablo 3. Arithmetical Averages and Standard Deviations in Terms of Critical Thinking Dispositions

Critical Thinking Dimensions	N	Average	Standard Deviation	Variance
Analyticity	400	4,59	,529	0,11
Open-mindedness	400	5,09	,552	0,08
Inquisitiveness	400	2,75	,615	0,77
Self-confidence	400	4,17	,703	0,07
Truth-seeking	400	3,33	,806	0,18
Systematicity	400	3,28	,775	0,74

When these findings are analyzed, it can be seen that individuals exhibit differences in terms of their critical thinking dimensions. When the average values in Table 3 are considered, it is easy to see that the individuals have higher scores on the Open-mindedness and Analyticity critical thinking dimensions. Thus, it can be said that these individuals assert that they think they exhibit more behaviors associated with these critical thinking dimensions. The thinking dimensions with the lowest averages are the Inquisitiveness and Systematicity critical thinking dimensions. This finding is consistent with the finding of Facione, Giancarlo, Facione ve Gainen's (1995) research called "The Tendency Towards Critical Thinking", that concluded students were found strong in open mindedness and inquisitiveness.

The Difference of Teacher Candidates' Critical Thinking Dispositions Related to Critical Thinking Dimensions

The second research question was about the critical thinking tendency differences of teacher candidates, and whether there are differences in terms of critical thinking dimensions.

In order to understand whether there is a significant difference among students' scores on critical thinking dimensions, a variance analysis was done. The results of the variance analysis on critical thinking dimensions are demonstrated in Table 4.

Table 4. Variance Analysis on Critical Thinking Dispositions Averages

Variance Source	Degree of Freedom	Sum of Squares	Mean Square	F	p
Between Groups	5	1702,457	340,491	753,664	,000*
Within Groups	2394	1081,564	,452		
Total	2399	2784,021			

(*)The mean difference is significant at the .05 disposition.

As can be seen in Table 4, the result of the variance analysis on students' critical thinking dispositions was found to be F=753.664 ($p<0.05$). This refers to a significant difference among the critical thinking dimensions. According to these findings, in order to determine meaningful differences in which among averages of critical thinking dimensions were taken advantage of Tukey HSD. The results are demonstrated in Table 5.

Table 5. The Results Related to Comparison Among Critical Thinking Dimensions

Critical Thinking Dimensions	Comparing Critical Thinking Dimensions	Average Different	p
Analyticity	Open-mindedness	4,73	,000*
	Inquisitiveness	1,89	,000*
	Self-confidence	,502	,000*
	Truth-seeking	1,360	,000*
	Systematicity	1,426	,000*
Open-mindedness	Inquisitiveness	2,36	,000*
	Self-confidence	,976	,000*
	Truth-seeking	1,83	,000*
	Systematicity	1,90	,000*
Inquisitiveness	Self-confidence	1,39	,000*
	Truth-seeking	,535	,000*
	Systematicity	,468	,000*
Self-confidence	Truth-seeking	,857	,000*
	Systematicity	,924	,000*
Truth-seeking	Systematicity	,066	,726*

(*)The mean difference is significant at the .05 disposition.

The dispersion of the differences amongst the dimensions of critical thinking, the critical thinking tendency possession-level of the teacher candidates shows significant differences. This finding is possible because, every dimension is restricted with the features of its own.

The Difference of Teacher Candidates' Critical Thinking Dispositions According to Different Variables
In this study, gender was taken as a variable. For each critical thinking dimension, there are individual differences in terms of exhibiting the related behaviours. Each individual feels the need for the different critical thinking dimensions depending on his/her own conditions. Table 6 shows the teacher candidates' diffrences of critical thinking types based on gender. Table 6. demonstrates the critical thinking disposition differences of the sample group according to their gender.

Table 6. Students' Critical Thinking Dispositions According to Their Gender

Critical Thinking Dimensions	Gender	N	Average	Standard Deviation	t	p
Analyticity	Female	254	4,61	,518	1,24	,214
	Male	146	4,54	,546		
Open-mindedness	Female	254	5,11	,579	2,19	,029*
	Male	146	4,98	,492		
Inquisitiveness	Female	254	2,63	,535	2,52	,012*
	Male	146	2,79	,723		
Self-confidence	Female	254	4,10	,693	,675	,500
	Male	146	4,05	,723		
Truth-seeking	Female	254	3,17	,747	2,00	,046*
	Male	146	3,33	,893		
Systematicity	Female	254	3,15	,847	,260	,795
	Male	146	3,17	,633		

(*)The mean difference is significant at the .05 disposition.

When averages regarding individuals' critical thinking levels according to their gender are taken into account, gender be considered as a factor. When the results in Table 6 are examined, it can be seen that gender plays an important role (at the significance level of 0.05) in the ciritcal thinking dimensions of Open-mindedness, Inquisitiveness and Truth-seeking.

In the researches that were conducted by Kaya (1997) and Çıkrıkçı (1993) on university students by using Watson-Glaser Critical Thinking Appraisal Scale to determine the critical thinking power of the students, it was aimed to find out the factors that affects the critical thinking power. According to the findings of these researches, there was not a significant difference between the points of the students according to their gender.

In another research that was conducted by Simon and Ward (1974) on a group of university students by using Watson-Glaser Critical Thinking Appraisal Scale, when they compared students' points with some of their personality features, it was found that there is a significant difference in the benefit of female students according to inference and evaluation of opposite opinions sub tests.

In this study, branch was taken as a second variable. Table 7 demonstrates the results regarding the distribution of critical thinking dimensions based on the branch factor.

Table 7. Students' Critical Thinking Dispositions According to Their Branch

Critical Thinking Dimensions	Branch	N	Average	Standard Deviation	Variance
Analyticity	Primary Mathematics Science Technology	106 164 104 26	4,67 4,49 4,69 4,49	,491 ,474 ,576 ,685	0,78 0,28 0,28 2,00

Open-mindedness	Primary Mathematics Science Technology	106 164 104 26	5,10 5,05 5,10 4,80	,724 ,467 ,449 ,570	0,23 0,46 0,49 0,67
Inquisitiveness	Primary Mathematics Science Technology	106 164 104 26	2,63 2,64 2,67 3,41	,514 ,555 ,574 ,986	0,81 0,82 2,08 1,88
Self-confidence	Primary Mathematics Science Technology	106 164 104 26	4,09 3,99 4,16 4,36	,717 ,628 ,795 ,631	1,57 0,83 0,29 0,00
Truth-seeking	Primary Mathematics Science Technology	106 164 104 26	3,22 3,21 3,11 3,84	,778 ,813 ,763 ,822	2,48 0,81 1,62 2,57
Systematicity	Primary Mathematics Science Technology	106 164 104 26	3,10 3,12 3,08 3,95	,590 ,591 ,513 2,01	2,67 0,97 4,57 1,37

Table 8. Variance Analysis on Critical Thinking Dispositions Averages According to Their Branches

Critical Thinking Dimensions	Variance Source	Sum of Squares	df	Mean Square	F	p
Analyticity	Between Groups Within Groups Total	3,70 108,00 111,71	3 396 399	1,23 ,273	4,53	,004*
Open-mindedness	Between Groups Within Groups Total	2,06 119,66 121,72	3 396 399	,688 ,302	2,27	,079
Inquisitiveness	Between Groups Within Groups Total	14,52 136,41 150,93	3 396 399	4,84 ,344	14,05	,000*
Self-confidence	Between Groups Within Groups Total	4,07 193,64 197,71	3 396 399	1,35 ,489	2,78	,041*
Truth-seeking	Between Groups Within Groups Total	11,37 248,32 259,69	3 396 399	3,79 ,627	6,04	,000*
Systematicity	Between Groups Within Groups Total	17,46 222,30 239,77	3 396 399	,582 ,561	10,37	,000*

(*)The mean difference is significant at the .05 disposition.

Table 8. demonstrates variance analysis on critical thinking dispositions averages according to their branch. According to their branches, when we examine Table 8, we can see that the sample group is affected by branch at the 0.05 values in terms of the Analyticity, Inquisitiveness, Self-confidence, Truth-seeking and Systematicity critical thinking dimensions.

Inquisitiveness expresses the individuals' tendency to acquire and learn new things. Here, it is normal that there are differences amongst the groups because; technology department is highly related to researches and project facilities. As a result, it can be said that, students gained these thinking habits and they display them.

Analyticity is about the tendency of using logic and objective evidence. Objectively, it was expected that students who are in Science departments have higher scores.

Open-mindedness expresses an individual's tolerance to different approaches and the sensitivity towards own faults. The main mentality in open mindedness is that, the individual does not only consider his own thoughts but

also the thoughts and views of others while making decisions. It was expected that primary school teacher candidates have this feature more than the others. This situation could be the source of difference.

Self-confidence, expresses individual's confidence in his/her own thinking processes. It is thought that, the candidates who are in the departments which include more research and project facility, show more self confidence.

Truth seeking shows that individual's tendency to look for the truth, question asking skills and objectivity despite the data opposing his/her ideas are relatively high. This thinking dimension is again seen more amongst the candidates who are in the departments which include more research and project facility.

Systematicity is the tendency of making organized, planned and careful researches. It can be said that the branches which requires the need for logical thinking, research and project facilities caused the difference amongst the groups.

A third variable was the class in which the teacher-candidates were enrolled in. In Table 9, we can see the distribution of critical thinking dimensions regarding class.

Table 9. Students' Critical Thinking Dispositions According to Their Classes

Critical Thinking Dimensions	Class	N	Average	Standard Deviation	Variance
Analyticity	1	70	4,00	0,87	0,75
	2	94	5,11	0,93	0,86
	3	112	4,44	1,33	1,78
	4	124	4,67	1,00	1,00
Open-mindedness	1	70	5,80	0,63	0,40
	2	94	5,30	1,06	1,12
	3	112	5,70	0,48	0,23
	4	124	4,20	1,40	1,96
Inquisitiveness	1	70	3,50	1,93	3,73
	2	94	2,33	1,56	2,42
	3	112	3,92	1,73	2,99
	4	124	2,58	2,07	4,27
Self-confidence	1	70	4,29	1,60	2,57
	2	94	5,71	0,49	0,24
	3	112	5,29	0,76	0,57
	4	124	2,86	0,69	0,48
Truth-seeking	1	70	3,43	1,13	1,29
	2	94	2,29	1,25	1,57
	3	112	3,43	2,37	5,62
	4	124	3,29	1,89	3,57
Systematicity	1	70	3,00	2,10	4,40
	2	94	2,83	1,94	3,77
	3	112	2,83	2,04	4,17
	4	124	3,50	2,26	5,10

Table 9 demonstrates variance analysis on critical thinking dispositions averages according to their classes. According to their classes, when we examine Table 10, we can see that the sample group is affected by branch at the 0.05 values in terms of the Self-confidence and Truth-seeking critical thinking dimensions. In these two critical thinking dimensions, there is a significant difference between classes.

In Elam's research (2001), which was aimed to determine the critical thinking power and the tendencies towards critical thinking amongst the students who are in the first and third grades, it was found that there was a statistically significant difference between the critical thinking tendencies and the grades of the students.

Table 10. Variance Analysis on Critical Thinking Dispositions Averages According to Their Classes

Critical Thinking Dimensions	Variance Source	Sum of Squares	df	Mean Square	F	p
Analyticity	Between Groups	1,949	3	,650	2,34	,073
	Within Groups	109,76	396	,277		

	Total	111,71	399			
Open-mindedness	Between Groups	,415	3	,138	,451	,717
	Within Groups	121,31	396	,306		
	Total	121,72	399			
Inquisitiveness	Between Groups	2,191	3	,730	1,94	,122
	Within Groups	148,74	396	,376		
	Total	150,93	399			
Self-confidence	Between Groups	41,97	3	13,99	26,16	,000*
	Within Groups	211,79	396	,535		
	Total	253,77	399			
Truth-seeking	Between Groups	8,46	3	2,82	4,83	,003*
	Within Groups	230,87	396	,583		
	Total	239,33	399			
Systematicity	Between Groups	1,95	3	,651	1,05	,335
	Within Groups	237,82	396	,601		
	Total	239,77	399			

(*)The mean difference is significant at the .05 disposition.

The programme type from which the teacher-candidates graduated was another variable in this study. In Table 11, we can see the distribution of critical thinking dimensions regarding the programme type.

Table 11. Students' Critical Thinking Dispositions According to Their Type of Graduation Programme

Critical Thinking Dimensions	Class	N	Average	Standard Deviation	Between Component Variance
Analyticity	General H. School	119	4,70	,525	
	Science H. School	11	4,37	,613	
	Super H. School	91	4,59	,533	
	Teacher H. School	54	4,56	,542	
	Vocational H. School	18	4,40	,702	
	Anatolian H.School	96	4,52	,465	
	Private H. School	6	4,31	,413	
	Others	5	4,80	,298	
	Total	400	4,59	,529	,006
Open-mindedness	General H. School	119	5,11	,717	
	Science H. School	11	4,92	,498	
	Super H. School	91	5,02	,455	
	Teacher H. School	54	5,01	,515	
	Vocational H. School	18	4,86	,545	
	Anatolian H.School	96	5,10	,436	
	Private H. School	6	5,26	,320	
	Others	5	5,16	,151	
	Total	400	5,06	,552	-,000
Inquisitiveness	General H. School	119	2,75	,687	
	Science H. School	11	3,03	,483	
	Super H. School	91	2,59	,557	
	Teacher H. School	54	2,69	,525	
	Vocational H. School	18	3,18	,818	
	Anatolian H.School	96	2,60	,553	
	Private H. School	6	2,55	,408	
	Others	5	2,60	,505	
	Total	400	2,69	,615	
				,604	,016

Self-confidence	General H. School	119	4,11	,775	
	Science H. School	11	4,22	,555	
	Super H. School	91	4,06	,728	
	Teacher H. School	54	4,00	,682	
	Vocational H. School	18	4,27	,869	
	Anatolian H.School	96	4,046	,563	
	Private H. School	6	3,85	,372	
	Others	5	4,94	,721	
	Total	400	4,08	,703	,006
Truth-seeking	General H. School	119	3,18	,806	
	Science H. School	11	3,92	1,01	
	Super H. School	91	3,02	,716	
	Teacher H. School	54	3,35	,818	
	Vocational H. School	18	3,99	,726	
	Anatolian H.School	96	3,21	,775	
	Private H. School	6	3,14	,518	
	Others	5	3,03	,736	
	Total	400	3,23	,806	,054
Systematicity	General H. School	119	3,29	1,12	
	Science H. School	11	2,87	,401	
	Super H. School	91	3,03	,524	
	Teacher H. School	54	3,18	,621	
	Vocational H. School	18	3,37	,668	
	Anatolian H.School	96	3,14	,531	
	Private H. School	6	2,91	,502	
	Others	5	3,03	,447	
	Total	400	3,16	,775	,005

The results related to the distribution of critical thinking dimensions and the school type the subjects graduated from is shown in Table 12. According to their type of graduation programme, when we examine Table.12, we can see that the sample group is affected by type of graduation programme at the 0.05 values in terms of the Analyticity, Inquisitiveness and Truth-seeking critical thinking dimensions. In these three critical thinking dimensions, there is a significant difference between types of graduation programme groups.

Table 12. Variance Analysis on Critical Thinking Dispositions Averages According to the Programmes They Graduated

Critical Thinking Dimensions	Variance Source	Sum of Squares	df	Mean Square	F	p
Analyticity	Between Groups	3,931	7	,562	2,043	,049*
	Within Groups	107,779	392	,275		
	Total	111,710	399			
Open-mindedness	Between Groups	1,968	7	,281	,920	,491
	Within Groups	119,759	392	,306		
	Total	121,727	399			
Inquisitiveness	Between Groups	7,804	7	1,115	3,053	,004*
	Within Groups	143,134	392	,365		
	Total	150,937	399			
Self-confidence	Between Groups	5,421	7	,774	1,579	,140
	Within Groups	192,298	392	,491		
	Total	197,719	399			
Truth-seeking	Between Groups	21,183	7	3,026	4,974	,000*
	Within Groups	238,513	392	,608		
	Total	259,696	399			
Systematicity	Between Groups	5,795	7	,828	1,387	,209
	Within Groups	233,981	392	,597		
	Total	239,776	399			

(*)The mean difference is significant at the .05 disposition.

Kürüm (2002), aimed to determine the levels of critical thinking power of teacher candidates and the thinking skills that forms this power, and also the factors that affects critical thinking. According to the findings of this

research, critical thinking power levels of the teacher candidates and the thinking skills that form this power are in the middle level. In addition, age, the high school they graduated, university exam entrance point type, the programmes they are attending, income level and social activities are influential on candidates' thinking power and their thinking skills as different variables.

IV. DISCUSSION AND CONCLUSIONS

When the findings regarding students' critical thinking disposition distributions are considered, average scores show that the critical thinking dimensions of Open-mindedness and Analyticity are the highest two. Low critical thinking dispositions are Inquisitiveness and Systematicity. According to these findings, it can be said that the subjects in the study have the tendencies of being cautious towards situations that lead to potential problems, using logic and objective evidence in problematic situations (Analyticity), and also have the tendencies of being open-minded, tolerant to different approaches and sensitive towards own faults (Open-mindedness). The fact that Inquisitiveness and Systematicity dimensions were found low in terms of exhibiting the required behaviours, it can be said that teacher-candidates are reluctant to show intellectual inquisitiveness behaviours such as acquiring and learning new things without expectations regarding benefits, and behaviours related to systematic, organized, planned and cautious researching.

Teacher-candidates' critical thinking disposition distributions are different from each other. There is a significant difference among critical thinking dimensions. When we look at the average scores regarding critical thinking dimensions, only Truth-seeking and Systematicity do not show a significant difference. In other words, there is no relationship between a person's possessing the qualities for the critical thinking dimension of truth-seeking and the qualities for the dimension of systematicity. The critical thinking dimension of truth-seeking focuses on evaluating alternatives and different thoughts. In this dimension, the possibility of an individual to seek truth, ask questions, act objectively despite data opposing his views is very high. In the dimension of systematicity, the individual is in the tendency of using strategic decision-making dispositions based on information and a given procedure. She/he focuses on organized thinking, planning, being cautious and researching. Based on these findings, it is possible to claim that having principles, thinking in an organized way, being organized and always acting objectively are complementary criteria.

In the study, another research question was about the disposition of teacher-candidates' critical thinking tendencies with respect to gender, branch, class and the school type they graduated from. When average scores related to gender variable are considered, Open-mindedness, Inquisitiveness and Truth-seeking are found to be a factor at a significance disposition of 0.05.

According to their branches, there is a significant difference between branch groups. In the Analyticity, Inquisitiveness, Self-confidence, Truth-seeking and Systematicity critical thinking dimensions, there is a significant difference between branch groups. In these five critical thinking dimensions, there is a significant difference between branch groups. It can be claimed that having a different education and qualifications unique to the study area has made students develop different behaviors within different critical thinking dimensions.

In the other critical thinking dimension, it can be seen that having an education and master's in one specific area is not a factor. One of the characteristics of critical thinking dimensions is that it is possible to talk about a profile of critical thinking dimensions for individuals, rather than extremes and absolute values. Thinking dimensions are thought of as combinations of individual preferences.

According to their classes, in the Self-confidence and Truth-seeking critical thinking dimensions, there is a significant difference between grade disposition groups. Self-confidence, as its name suggests, is the person's confidence in himself regarding his own process of logical thinking. It can be expected that the higher the class grade, the higher the disposition of self-confidence. Likewise, developing objective behaviours can be expected to increase together with class disposition. In terms of type of graduation programme, in the Analyticity, Inquisitiveness and Truth-seeking critical thinking dimensions, there is a significant difference between types of graduation programme groups. This finding leads to such an explanation. The type of high school that the students gradutaed from affects both their individual and social development. The education they received would shape the behaviours they exhibit.

To increase the critical thinking levels of the teacher candidates and making them gain these skills, the followings are suggested: (1) 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. (2) There should be socio-cultural activities

devoted to improve the teacher candidates' critical thinking skills and the candidates should be encouraged to attend them.

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