

Multidimensional Analysis of the Teaching Process of the Critical Thinking Skills¹

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Received : 2019.12.01

Rev. Req. : 2020.02.03

Accepted : 2020. 04.04

DOI: 10.46303/ressat.05.02.8

How to cite this paper: Polat, S. (2020). Multidimensional analysis of the teaching process of the critical thinking skills. *Research in Social Sciences and Technology*, 5(2), 134-157. doi.org/10.46303/ressat.05.02.8

Abstract

This study aims to evaluate critical thinking skills in a multidimensional way. Based on this objective, the level of teachers' critical thinking skills, how they conceptualize critical thinking, their practices of critical thinking in the classroom, and if the critical thinking is referred enough in the curriculum are analyzed in this research. In terms of the research objective, this study is mixed-method: The relational model was used for the quantitative part of the research, and the case study method was used for the qualitative part. The research data was collected in the academic year 2013-2014. The study group from which quantitative data was collected consists of 323 males and 377 females, totaling 700 teachers, and the other study group from which the qualitative data was collected involves 16 teachers working at two primary and two elementary schools.

Keywords: Critical thinking, teaching critical thinking, California critical thinking scale

Introduction

Individuals can never remain indifferent to their environment. They follow the environment with great curiosity. They cannot confine themselves and seek better conditions by shaping nature. In the process of creating these conditions, they try to use their thinking abilities, which is the most important factor that separates humans from other living beings.

Because of its great importance, many definitions were made about thinking and the awareness of what to think, from past to present. According to Dewey (1910), thinking is taking steps while realizing what will happen in the future, like sensing the indicators of rain. According to Vygotsky and Bruner, as an effective and a magic word, thinking is the awareness of one's cognition and metacognition (Lipman, 2003). Thinking is the process of solving a problem,

¹ * This study was produced from the author's doctoral dissertation.

Polat, S. (2014). *Multidimensional analysis of the teaching process of the critical thinking skills* (Unpublished doctoral dissertation). University of Necmettin Erbakan, Turkey.

building words based on a specific goal, and a logic pattern that extends from univariate simple cause-and-effect relations to multidimensional and multivariate complex cause-effect relations (Aydın, 2003; Houdyshell & Kirk, 2018; Kratt, 2018).

The modern world requires modern human thinking skills. In teaching, learning how to think takes a much more important place than exchanging knowledge. Therefore, students who think, criticize, produce, and know how to obtain information are educated in schools, and curriculums are prepared for them to improve their thinking skills (Seferoğlu & Akbıyık, 2006). For this reason, the students who have critical thinking skills do not have any difficulty developing a new vision, behavior, or attitude, or changing them from the old ones (Şengül & Üstündağ, 2007).

In Turkey in 2005, the national curriculum that originated in the constructivist philosophy was introduced as a result of fundamental changes in the national curricula. In the new curriculum, critical thinking was included as a fundamental skill. For this reason, there was a great increase in critical thinking skills studies after 2005. In literature, many studies about determining the critical thinking skill levels are available (Akillı, 2012; Hove, 2011). It is also observed that there are many studies about determining fundamental skills in the curriculum (Başoğlu & Mutlu, 2012; Hall & Quinn, 2014; Özensoy, 2012). Again, many studies about critical thinking skills have been determined (Fung & Howe, 2012; Kutlu & Schreglmann, 2011; Yang, 2012). Most of these studies are conducted for primary, secondary, and undergraduate students. At the same time, some studies about determining the teachers' critical thinking level are found in the literature (Korkmaz, 2009; Kutlu & Schreglmann, 2011). These studies are researched by the teachers and lecturers.

Considering the sampling groups of the studies mentioned above, it is seen that these studies are carried out mostly by the teachers. In addition, there are some studies about analyzing curricula. Analysis of these studies indicates that the curriculum is suitable to achieve critical thinking skills; however, teachers' critical thinking skill levels are not sufficient. In this context, this study is significant for analyzing the curricula and elements that direct the teachers in a multidirectional way (Ahmed, 2016; Bakalar, 2017). By means of this study, it is expected to fill the gap in the literature and contribute to teaching critical thinking skills with the help of teachers who conceptualize critical thinking and apply it to their classrooms.

The basic starting point of this study is to identify teachers' levels of critical thinking skills and the way they conceptualize it, and to reveal the classroom executions of critical thinking skills and to determine how much space is given for critical thinking skills in the curriculum. In this context, the main objective of this study is to analyze the teaching of critical thinking skills in a multidirectional way.

Research Questions

Answers to the following five questions are analyzed to achieve the research objectives:

1) What is the level of the teachers' critical thinking skills?

- 2) Do the teachers' critical thinking skill levels change by subject, gender, and experience?
- 3) How do the teachers conceptualize critical thinking?
- 4) What are the classroom applications or activities about critical thinking?

Methodology

Research Design

In this study, a mixed-method research design is used to analyze the teaching critical thinking skills multi-directionally. With the mixed-method research design, the research topic can be explored in-depth (Fraenkel, Wallen, & Hyun, 2012). This type of design is an approach consisting of a mixture of quantitative and qualitative methods and paradigms. This approach predicts the blend of quantitative and qualitative methods and also anticipates that both methods can be used in one (mixed) research (Balci, 2011). According to this study implementing a mixed-method research design, a model is used to determine the level of teachers' critical thinking skills, and the relational model is used to analyze the level of critical thinking skills through different variables. Using these two methods creates the quantitative dimension of the study. In the qualitative part of the research, the case study method is used, which is preferred commonly in the qualitative part of the studies. In addition to the case study's different patterns (such as a single case and multiple cases), multiple nested cases are also used in this research. In this multiple nested case pattern, each case included in the study is divided into several sub-categories, and they are compared and contrasted with one another (Yıldırım & Şimşek, 2011).

Study Group

The quantitative data of this research was collected in the 2013-2014 academic year with the participation of the study group consisting of 323 males and 377 females, totaling 700 teachers who work in the central districts of Konya. In Table 1, the demographic characteristics of teachers in the study group are shown.

Table 1. Demographic Characteristics of the Study Group

General characteristics of the teachers		N	%
Subject	Turkish	135	19.3
	Math	137	19.6
	Social Studies	129	18.4
	Science	136	19.4
Gender	Primary Education	163	23.3
	Male	377	53.9
Experience	Female	323	46.1
	1-5 year(s)	251	35.9
	6-10 years	208	29.7
	11-15 years	154	22.0
Total	16 years and above	87	12.4
		700	100.0

In the collection of the quantitative data for the research, the convenience sampling method is used among the purposeful sampling methods. This sampling method is used for choosing the cases which are suitable to access (Glesne, 2013). One of the reasons to prefer the convenience sampling method is to have a long observation process (three months). The qualitative study group consists of two groups of teachers who work in two primary and two elementary schools. Observations and interviews were conducted with the teachers in the study group. Qualitative study group teachers' demographic characteristics are shown in Table 2.

Table 2. Demographic Characteristics of the Study Group

General characteristics of the teachers		N
Subject	Turkish	2
	Math	3
	Social Studies	2
	Science	2
	Primary Education	7
Gender	Male	10
	Female	6
	1-5 year(s)	1
Experience	6-10 years	10
	11-15 years	3
	16 years and above	2
Total		16

Data Collection Tools

The research data is collected by these tools: Personal Information Form, the California Critical Thinking Disposition Inventory (CCTDI), Teacher Interview Form, Teacher Observation Form (TOF), and Document Review Form (DRF).

The California Critical Thinking Disposition Inventory (CCTDI). Developed by Facione (1990) and adapted into Turkish by İskifoglu and Ağazade (2013), the CCTDI was used to determine teachers' critical thinking disposition levels in this research. The California Critical Thinking Disposition Inventory consists of 75 items and seven subcategories. When they are considered as a whole, the scores taken on this inventory are as follows: 70 to 209 is low, 210 to 279 is moderate, and 280 to 420 is high. This study is conducted with the participation of 587 university students. The internal consistency coefficients of the scale's subcategories are as follows: internal coefficients are in alpha order: truth-seeking is 72, open-mindedness is 73, analyticity is 72, sistematicity is 74, CT self-confidence is 78, inquisitiveness is 80, and maturity of judgment is 75. The scale's complete internal consistency's coefficient is calculated as 90 (Facione, Giancarlo, & Facione, 1995).

Teacher Interview Form. Data obtained from expert opinions and the results of the literature reviews are taken as a base to prepare the teacher interview form (Doğanay & Sarı, 2012; Nosich, 2012; Yeşilpınar, 2011). In this context, the research questions are as follows: (i) How do the teachers conceptualize critical thinking? (ii) How should critical thinking be learned and

developed? (iii) What kind of preparations do the teachers make before the lessons, and how do they use the guidebooks? (iv) What are the teachers' suggestions for teaching critical thinking? The draft form was presented to the five academicians who are experts in the field to analyze the form in an objective way. To increase the reliability and validity of the data, necessary changes were made to the form. In interview-based studies, the interview form must be subjected to a pilot study before starting the research. A pilot study is necessary for the consistency of both the researcher and the interview form (Silverman, 1993; Türnüklü, 2000). Accordingly, a pilot study was conducted by the researcher in December, 2013, with the participation of math and science teachers. After these interviews, necessary arrangements were made, and the form was finalized. According to Glesne (2013), for the reliability of the study, the researcher should give real information to the participants. Based on this fact, the researcher provided the real information about the objective of the research to the participants before starting the interviews and also informed them that the interview would be recorded by voice recorder.

Teacher Observation Form (TOF). The fourth research question of this study is: "What are the classroom applications or activities about critical thinking?" Data obtained from expert opinions and the results of the literature reviews are taken as a base to prepare the teacher observation form (Doğanay & Sarı, 2012; Nosich, 2012). To ensure the reliability of the Teacher Observation Form (TOF), two different studies were conducted. In the first study, each teacher was observed twice systematically (unattended) by the researcher (Balci, 2011). In terms of reliability, observations repeated over time are important (Balci, 2011). For the reliability of the form, the consistency of the observers is also considered. In this case, the Kappa statistic is commonly used for reliability (Yurdugül, 2013). In this study, two observers observed three different teachers' lessons. One of the observers is the researcher; the other observer is the expert on the subject. The result of the observation is indicated in the observation form. The data is analyzed with Cohen Kappa coefficients. It is seen that there is a meaningful relationship between the level of consistency of the two observers (Kappa = .772; $p < 0.001$).

Document Review Form (DRF). Document examination is done to answer the research question, "How much space is given to what items on the critical thinking skills in the curriculum?" According to Merriam (2013), the documents are described as visual documents, physical materials, artworks, and social records used in qualitative researches as the third main data collection resource. The document review means analyzing the written materials, including the information about the targeted facts (Yıldırım & Şimşek, 2011). In the process of creating the form, the definition of critical thinking skills in the curriculum is taken into consideration. The critical thinking skill is defined in the curriculum as follows (Ministry of National Education [MoNE], 2012): "Critical Thinking: (i) Distinguishing the known and the unknown, (ii) Determining the accuracy of the known, (iii) Questioning the causes of the facts, (iv) Interrelating the event and the facts, (v) Determining the integrity and validity of the given information, (vi) Describing the irrationality and the misjudgments of the given information, (vii) Noticing the differences between facts and convictions (facts and opinions), (viii) Diagnosing the reasonable criteria to analyze the conformity or the value of an action or behavior, (ix) Expressing the logic behind the opinions and ideas, (x) is the process of reaching logical

conclusions and judgments.” According to these criteria, critical thinking skills activities are assigned in curriculum and teachers’ guidebooks.

Collecting the Data

The California Critical Thinking Disposition Inventory (CCTDI) was distributed between July and September, 2013. It takes around 30 minutes to answer the scale. Seventy scale forms among the 770 obtained scale forms were excluded from the research because of various reasons. The data was collected from a total of 700 participants, and all were included in the analysis. The interviews were conducted in December, 2013, to obtain the data about how the teachers conceptualize critical thinking. Before starting the interviews, the participants were informed about the objective of the research and voice recording. Each interview took approximately 10 minutes. Between October and December, 2013, research observations were carried out to obtain data about critical thinking classroom practices. In these observations, the lessons of Turkish language, social science, science, math, and life science were observed from the level of 1st to 8th grades. The document analysis was performed to determine how much space was given to critical thinking in the curriculum.

Data Analysis

The analysis was conducted by Insight Assessment; all rights are reserved for the California Critical Thinking Disposition Inventory (CCTDI). The arithmetic means and the standard deviations of the CCTDI’s data were calculated. A t-test was made to prove whether the teachers’ critical thinking skills are affected by gender or not. The ANOVA test, the one-way analysis of variance test, was used to determine whether experience and subject of the teachers show a significant difference in teachers’ critical thinking skills. If there is a difference between the groups, the Tukey HSD test was done to understand which group’s mean scores affect the results. In the process of analyzing the subcategory scores of the CCTDI’s compatibility with standard distribution, skewness and kurtosis coefficients, and the Kolmogorov-Smirnov test was conducted. Regarding the normal distribution, if the skewness and the kurtosis values are (+,-1), then they are regarded as perfect; if the values are (+,-2), then they are approved as non-objectionable (George & Mallery, 2003). When the data is analyzed, it is seen that all the values are perfect regarding normal distribution.

The data obtained from the teacher interview form was subjected to content analysis with the help of “QSR NVivo 10” software. According to Yıldırım & Şimşek (2011), the fundamental purpose of the content analysis is to reach the concepts which explain the obtained data, codes, and relations with one another. The content analysis was named as thematic analysis by Glesne (2013). In such an analysis, the researcher focuses on analytical techniques to find out the themes and the patterns among the data. One of the most important characteristics of these kinds of studies is coding the obtained data. During the data analysis of the interviews, 168 minutes of voice recording was transcribed, and a 32-paged raw data file was obtained. This raw data file was transmitted into the NVivo program. Five main themes and 40 subthemes were acquired as a result of the analysis. The Teacher Observation Form (TOF) was used for

determining the teachers' critical thinking classroom practices. Each item in the form is scored as "observed" (1) and "not observed" (0). The obtained data from the TOF were transferred into Microsoft Excel to calculate the percentage of frequency. The Document Review Form (DRF) was used to determine the scales about critical thinking skills placed in the curriculum. To start the analysis, digital records of the guidebooks and curricula were obtained. These digital records were scanned with the keywords identified from the DRF, and obtained data were transferred into Microsoft Excel to calculate the frequency values.

Reliability and Validity Studies for the Research's Qualitative Part

In order to increase the validity and reliability of the qualitative dimension of this research, the activities conducted in accordance with the recommendations of Merriam (2013), Miles and Huberman (1994), and Yıldırım and Şimşek (2011) are described as follows: (i) During the interviews, observation and the document analysis was used to provide the internal validity and the external reliability. Thus, the triangulation technique was used; (ii) Participant confirmation was obtained by getting feedback from them; (iii) To increase the internal validity, it was referred to expert opinion about research methodology, observation items, and interviews questions; (iv) The data continued to be obtained, analyzed, and spent enough time until it reached a certain saturation to provide the internal validity and the credibility of the research; (v) Each teacher was observed twice. Thirty-two observations were made during the research. Three of all observations were made by two observers. Thus, the consistency between the observers is determined by the kappa test; (vi) The processes that were performed in this process were clearly explained to provide external reliability. As a result, the methodology of the research, study group, data collection tools, data collection process, the analysis of the data, and the interpretation were described comprehensively.

Findings

Research Question 1

The statistical data obtained from the CCTDI was analyzed to find an answer to the first question of our research, "What is the level of the teachers' critical thinking skills?" The standard deviations and the mean scores of the teachers' critical thinking skill levels are shown in Table 3.

Table 3. The Standard Deviations and the Mean Scores of the Teachers' Critical Thinking Skill Levels

Subcategories	N	\bar{X}	SS
Truth-seeking	700	35.81	4.91
Open-mindedness		31.05	4.42
Analyticity		29.72	4.43
Systematicity		30.57	4.93
Inquisitiveness		30.45	5.20
CT self-confidence		29.54	6.27
Maturity of judgment		30.85	5.68
Total		217.99	22.28

Table 3 shows that the mean scores of the subcategory of truth-seeking are 38.81, the subcategory of open-mindedness is 31.05, the subcategory of analyticity is 29.72, the subcategory of systematicity is 30.57, the subcategory of inquisitiveness is 30.45, the subcategory of CT self-confidence is 29.54, the subcategory of maturity of judgment is 38.85, and the total scores of the California Critical Thinking Disposition Inventory are 217.99. As a result, it can be suggested that teachers' critical thinking skills are described as medium level both in subcategories and the total scores.

Research Question 2

The results of the California Critical Thinking Disposition Inventory are compared and contrasted according to the teachers' subjects, genders, and experience to answer the second question of the research, "Do the teachers' critical thinking skill levels change by subject, gender, and experience?" T-tests were carried out based on the result of teachers' California Critical Thinking Disposition Inventory by their genders. The result of this t-test is shown in Table 4.

Table 4: Teachers Critical Thinking Disposition Inventory t-Test Results by Their Genders

Subcategories	Gender	N	\bar{X}	SS	t
Truth-seeking	Male	377	35.95	4.86	.81
	Female	323	35.64	4.97	
Open-mindedness	Male	377	31.38	4.39	2.12*
	Female	323	30.67	4.42	
Analyticity	Male	377	29.96	4.45	1.52
	Female	323	29.45	4.41	
Sistematicity	Male	377	30.88	4.77	1.81
	Female	323	30.20	5.09	
Inquisitiveness	Male	377	30.97	5.01	2.88**
	Female	323	29.84	5.35	
CT self-confidence	Male	377	29.74	6.24	.90
	Female	323	29.31	6.30	
Maturity of judgment	Male	377	31.98	5.75	5.82**
	Female	323	29.54	5.31	
Total	Male	377	220.85	22.24	3.70**
	Female	323	214.65	21.90	

* $p < 0.05$; ** $p < 0.01$

Based on the analysis of Table 4, the teachers' critical thinking skill levels show the difference in the subcategories by gender variable. According to these results, male teachers' inquisitiveness (= 30.97; $p < .01$) and open-mindedness (= 31.88; $p < .05$) scores are significantly higher than those of the female teachers. Similarly, male teachers' mean scores (= 220.85; $p < .01$) are significantly higher than the female teachers' mean scores. No significant difference was observed in other subcategories. A one-way ANOVA variance analysis was done to determine if the subjects of the teachers have an effect on their critical thinking skill levels. Additionally, the Tukey HSD test was done to find out which group's mean score causes the difference. All results are presented in Table 5.

Table 5. The Results of Mean, Standard Deviation, and ANOVA Scores Regarding Teachers' Critical Thinking Skill Levels by Their Subject

Subcategories	Variance source	KT	SD	KO	F	Tukey
Truth-seeking	Between-group	26.12	4	6.53	.27	
	Within group	16831.73	695	24.22		
Open-mindedness	Between-group	136.26	4	34.07	1.75	
	Within group	13507.20	695	19.43		
Analyticity	Between-group	197.36	4	49.34	2.53	1-2
	Within group	13541.64	695	19.48		1-5
Sistematicity	Between-group	451.37	4	112.84	4.75**	1-2
	Within group	16522.54	695	23.77		
Inquisitiveness	Between-group	177.13	4	44.28	1.64	
	Within group	18723.91	695	26.94		
CT self-confidence	Between-group	368.93	4	92.23	2.37*	1-2
	Within group	27095.10	695	38.99		1-5
Maturity of judgment	Between-group	281.69	4	70.42	2.20	
	Within group	22251.44	695	32.02		
Total	Between-group	5631.38	4	1407.84	2.87*	1-2
	Within group	341497.82	695	491.36		1-5

* $p < 0.05$; ** $p < 0.01$

When Table 5 is analyzed, significant differences are observed in the analyticity ($F(2.53)$; $p < .05$), sistematicity ($F(4.75)$; $p < .01$), and CT self-confidence ($F(2.3)$; $p = .05$) dimensions. Therefore, the total score of teachers' critical thinking skill levels differs ($F(2.87)$; $p < .05$). When the results of the Tukey HSD test are analyzed, it is observed that the Turkish teachers' mean scores regarding analyticity, sistematicity, CT self-confidence, and total score are significantly higher than the Mathematic Teachers' mean scores.

A one-way ANOVA test was used to determine if there is a significant change in teachers' critical thinking skill levels in terms of experience. The result of this test is presented in Table 6.

Table 6. The Results of Mean, Standard Deviation, and ANOVA Test Regarding Teachers' Critical Thinking Skill Levels by Their Experience.

Subcategories	Variance Source	KT	SD	KO	F
Truth-seeking	Between-group	34.20	3	11.40	.47
	Within Group	16823.66	696	24.17	
Open-mindedness	Between-group	50.95	3	16.98	.87
	Within Group	13592.50	696	19.53	
Analyticity	Between-group	4.89	3	1.63	.08
	Within Group	13734.11	696	19.73	
Sistematicity	Between-group	83.36	3	27.79	1.14
	Within Group	16890.56	696	24.27	
Inquisitiveness	Between-group	17.23	3	5.74	.21
	Within Group	18883.82	696	27.13	
CT self-confidence	Between-group	76.12	3	25.37	.64
	Within Group	27387.90	696	39.35	
Maturity of judgment	Between-group	191.43	3	63.81	1.99
	Within Group	22341.71	696	32.10	

Total	Between-group	1167.17	3	389.06	
	Within Group	345962.02	696	497.07	.78

According to the experience variable, the subcategory scores of teachers' critical thinking skill levels are as follows: truth-seeking is 36.10, open-mindedness is 31.49, CT self-confidence is 30.09, and maturity of judgment is 31.38. The highest mean score of subcategories is observed in the teachers who have 11-15 years of experience in teaching. The lowest mean score of subcategories is as follows: truth-seeking is 35.32, sistematicity is 30.05, inquisitiveness is 30.18, and maturity of judgment is 30.26. The lowest mean score of subcategories is observed in the teachers who have 16 or more years of experience. In the total score, the highest mean score is 220.25 for 11-15 years of experience, and the lowest mean score is 216.55 for teachers with 16+ years experience. Therefore, it can be indicated that there is no significant difference in the total score of the critical thinking skills level by teachers' experience variable.

Research Question 3

The third question of this research is: "How do the teachers conceptualize critical thinking?" To answer this question, interviews were conducted. In these interviews, some questions were addressed to the teachers to learn more about their critical thinking classroom practices, pre-course preparations, their suggestions about the guidebooks, and teaching critical thinking. The results are presented in the following subheadings.

Teachers' opinions about conceptualizing critical thinking. The first question was about how they conceptualize critical thinking. The teachers' opinions about conceptualizing critical thinking were coded, as shown in Figure 1.

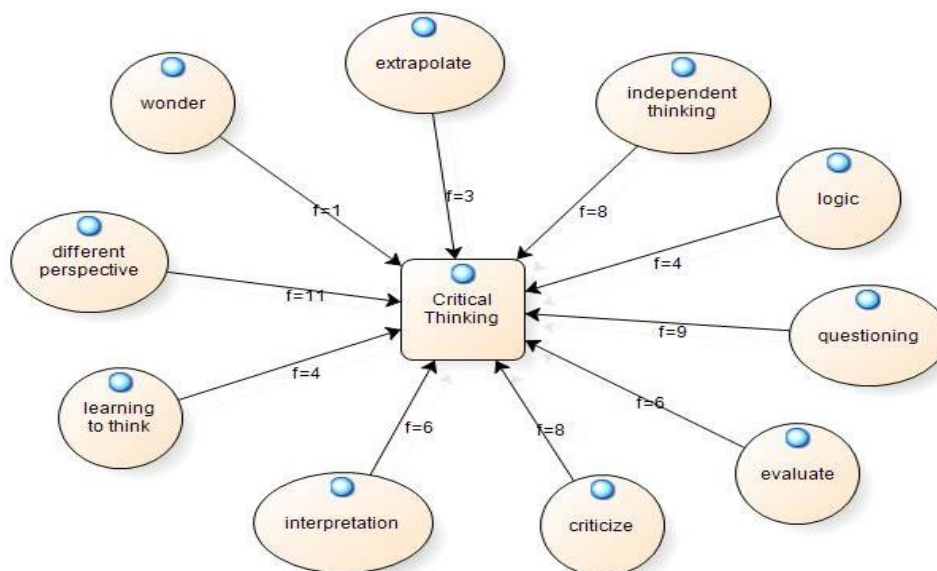


Figure 1. The model formed by the teachers' opinions about conceptualizing critical thinking

Figure 1 shows that teachers mostly expressed their ideas about the concept of “developing different perspectives,” and they rarely mentioned the concept of “inquisitiveness.” The following are the expressions of teachers supporting this finding:

“Critical thinking is not looking at the events unidirectionally or accepting the events without questioning. Critical thinking is being curious and evaluating the events according to the personal perspective and inner world.” (N. Küçük)

“Critical thinking might be making an effort to see things not only from his perspective but also to see them from society’s perspective to make life more livable.” (i. Ersoy)

Teachers’ opinions about their preferences on teaching critical thinking. The second question was about teaching critical thinking. This question aims to determine the teachers’ classroom practices about critical thinking. These practices are presented in Figure 2.

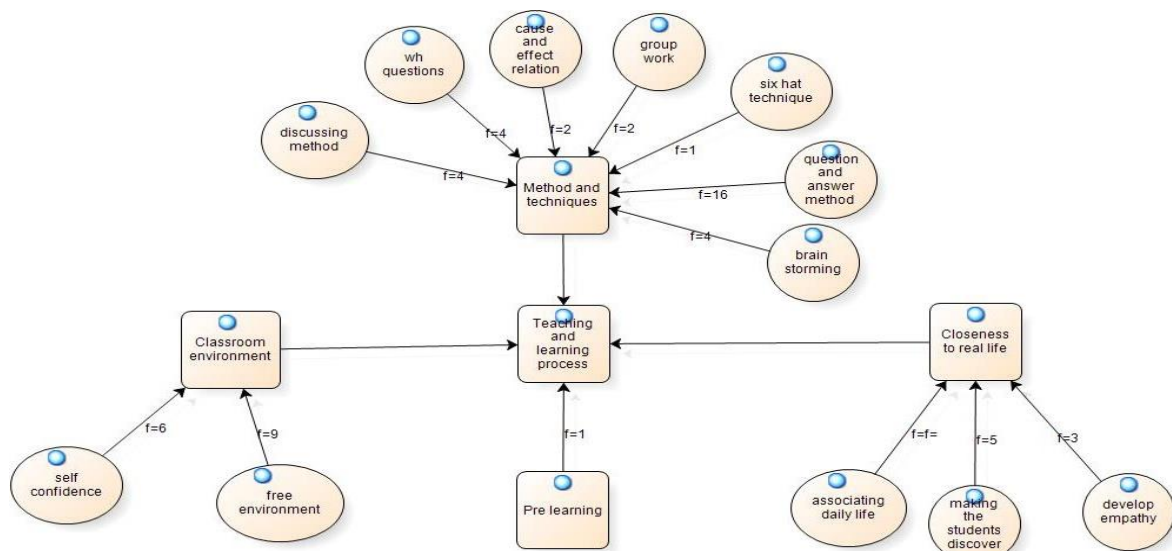


Figure 2. The teachers’ approaches to critical thinking classroom practices

Figure 2 shows that the teachers mostly preferred the “asking and answering the questions” method, and they occasionally preferred the “cause and effect,” “activating the pre-learning,” and “group works” methods to teach critical thinking. The following are statements that reflect teachers’ opinions on the subject of teaching critical thinking:

“I have a niggling personality. And this characteristic turns into an advantage for me during the lessons. I ask questions to make the students think in depth. I ask questions to make them think from a different perspective or to let them find the keywords of the topics.” (G. Kara)

Teachers’ opinions about pre-course preparations. The third question was about teachers’ opinions about the pre-course preparations and guidebooks. The figure showing the coding of teachers’ opinions about pre-course preparations is presented in Figure 3.

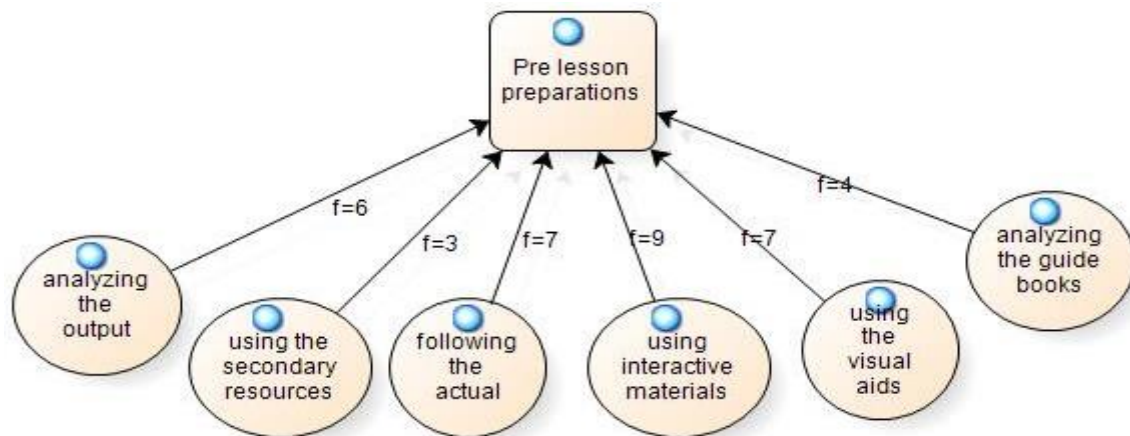


Figure 3. Teachers' opinions about pre-course preparations

Figure 3 shows that the teachers mostly preferred “using interactive materials,” and they occasionally preferred “using the secondary sources” and “analyzing the guidebooks” for pre-course preparation. However, they do not study guide books enough. Teachers’ opinions supporting these findings are as follows:

“For the pre-course preparation, technology has the biggest portion and priority. I mean, you need to prepare and order the videos and flash programs about the topic that you are going to discuss before your lesson.” (Ö. Yeşiltaş)

In the context of the third question, teachers’ opinions about using guidebooks were analyzed. The coding of the teachers’ opinions about guidebooks is presented in Figure 4.

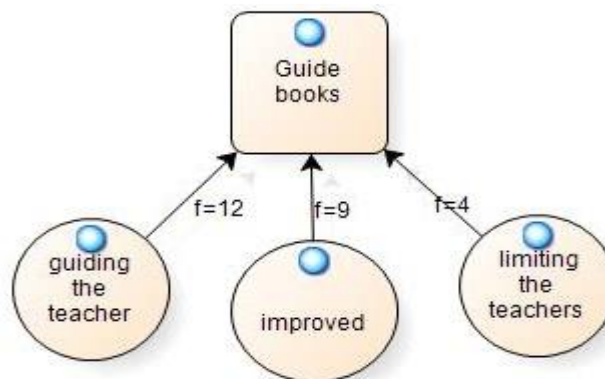


Figure 4. Teachers' opinions about guidebooks

Figure 4 shows that teachers mostly preferred “guiding the teacher” and occasionally “limiting the teachers.” The teachers’ statements supporting these findings are as follows:

“I think these guidebooks are like plays and makes the teacher the lead role of the play. The reason is that the pattern is drawn, and all you have to do is follow the pattern. And of course, as a teacher, you can put your ideas into this pattern.” (E. Tanç)

Teachers' suggestions about teaching critical thinking. The fourth question was about teachers' suggestions about teaching critical thinking. In Figure 5, the coding formed by teachers' suggestions about teaching critical thinking is presented.

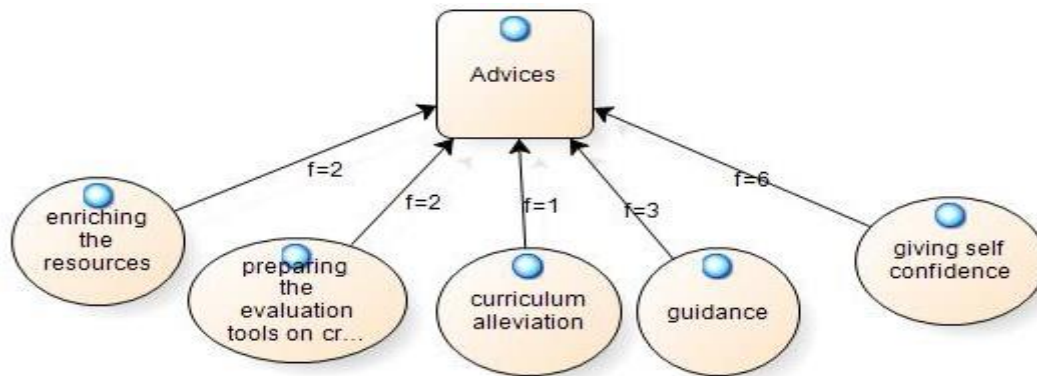


Figure 5. The teachers' suggestions about teaching critical teaching

Figure 5 shows that “giving self-confidence” is the most recommended suggestion, and “curriculum alleviation” is the least recommended suggestion. According to teachers' opinions, it can be said that to make the students think critically, they need to have full self-confidence. The teachers' statements supporting these findings are presented below:

“...as teachers, we need to believe our students' opinions and their expression during the lesson. If we praise their opinions next lesson, they are going to come up with a new idea.” (A. Atal)

Research Question 4

The fourth question of the research is: “What are the classroom applications or activities about critical thinking?” To answer this question, the Teacher Observation Form (TOF) was used to collect the necessary data. The frequency and the percentage distribution values of each item of the TOF is presented in Table 7.

Table 7. The Percentage and the Frequency Values of the Items of TOF

Items	Observed		Not observed		Total	
	%	F	%	F	%	f
1. Questioning what students know about the subject (pre-learning)	91	29	9	3	100	32
2. Mentioning the aim of the topic and its sub-objectives and its problems	22	7	78	25	100	32
3. Explaining the main concepts of the topic	69	22	31	10	100	32
4. Avoiding authoritarian and repressive behaviors and adopting a tolerant approach	100	32	0	0	100	32
5. Asking students about the main concepts and enabling them to comment	88	28	13	4	100	32

6. Asking students for reasons and evidence of answers given	53	17	47	15	100	32
7. Asking students to comment on their friends' different answers (whether they agree with their friends' answers or have another hypothesis to disprove their answers)	19	6	81	26	100	32
8. Asking students to express the concept in detail	56	18	44	14	100	32
9. Encouraging students to ask questions or to participate in the discussion about the topic	100	32	0	0	100	32
10. Letting students find an answer to their friends' questions	31	10	69	22	100	32
11. Asking students to find other solutions or answers to the questions	63	20	38	12	100	32
12. Making students think about events based on real life or hypothesis	19	6	81	26	100	32
13. Giving striking examples of the topic	66	21	34	11	100	32
14. Asking students to give an everyday example of the topic	63	20	38	12	100	32
15. Asking students to express their opinions on given examples	53	17	47	15	100	32
16. Encouraging students to compare and evaluate the different ideas	31	10	69	22	100	32
17. Ensuring students to establish cause-and-effect relationship	59	19	41	13	100	32
18. Allowing students an opportunity to explain their opinions in detail	81	26	19	6	100	32
19. Summarizing the topic to revive in the minds of students	94	30	6	2	100	32
20. Valuing and praising students	81	26	19	6	100	32
21. Using the visual aids related to the topic	78	25	22	7	100	32
22. Asking students to tell the liked and disliked aspects of the visual aids	13	4	88	28	100	32
23. Asking students to make a diagram graphic or concept map about the topic by helping each other	6	2	94	30	100	32
24. Transferring most of the evaluations and determinations to the board regularly and briefly	88	28	13	4	100	32
25. Making students question whether the aim given at the beginning of the subject has been achieved	47	15	53	17	100	32
26. Asking students if they have another point of view to the topic to achieve the aim given at the beginning of the class	16	5	84	27	100	32
27. Letting students question if they can use this information in their daily lives	31	10	69	22	100	32
28. Questioning the reliability of the resources (teacher visual aids, books, etc.)	6	2	94	30	100	32

Table 7 shows that “avoiding authoritarian and repressive behaviors and adopting a tolerant approach” and “encouraging students to ask questions or to participate in the discussion about the topic” are observed throughout the lessons. At the same time, “asking students to make a diagram graphic or concept map about the topic by helping each other” and “questioning the reliability of the resources (teacher visual aids, books, etc.)” are observed in only six percent of the lessons. According to these results, it can be said that teachers are very tolerant and keep the students consistently active during the lesson.

Research Question 5

The fifth question of the research is: “How much space is given to what items on the critical thinking skills in the curriculum?” To answer this question, the Document Review Form was used to collect the data based on the Ministry of National Education’s definition of critical thinking. In this case, the researcher conducted an analysis of the guidebooks. The findings’ frequency distribution is presented in Table 8.

Table 8. The Number of Critical Thinking Activities in 1st to 8th Grades Teacher Guidebooks

Subjects	Grade	Number of Activities	Total
Life Science	1st Grade	4	35
	2nd Grade	14	
	3rd Grade	17	
Turkish	1st Grade	12	306
	2nd Grade	29	
	3rd Grade	40	
	4th Grade	52	
	5th Grade	30	
	6th Grade	39	
	7th Grade	52	
	8th Grade	52	
Science and Technology	4th Grade	22	129
	5th Grade	17	
	6th Grade	35	
	7th Grade	27	
Social Science	8th Grade	28	98
	4th Grade	19	
	5th Grade	9	
	6th Grade	12	
Mathematics	7th Grade	26	264
	8th Grade	32	
	1st Grade	30	
	2nd Grade	15	
	3rd Grade	42	
	4th Grade	40	
	5th Grade	40	
	6th Grade	39	
7th Grade	33		
	8th Grade	25	

Table 8 shows that the number of critical thinking activities in social studies guidebooks is 35. There is an increase in the activities from 1st to 3rd grades. The number of critical thinking activities in Turkish guidebooks is 306, and in mathematics guidebooks, it is 264 from 1st to 8th grades. The number of critical thinking activities in science and technology guidebooks is 129, and in social science books, it is 98 from 4th to 8th grades.

Discussion and Conclusion

The first question of the research is: “What is the level of the teachers’ critical thinking skills?” To answer this question, the teachers’ scores of the California Critical Thinking Disposition Inventory (CCDTI) and teachers’ standard deviation values were compared. As a result, it was observed that teachers’ scores for each of the CCDTI’s subcategories are not higher than 40 and not lower than 29. Therefore, it can be suggested that teachers’ critical thinking skill levels are at a medium level. When the findings obtained by answering the fifth question of the study were examined, it was observed that the teachers applied 19 of the 28 items in the Observation Form above 50 percent and the remaining nine items below 50 percent. According to this finding, it can be said that the teachers also have a medium level of critical thinking teaching activities.

There are studies in the literature that reveal different results regarding the critical thinking skill levels of the participants. For instance, in the studies of Baydar (2012), Saçlı and Demirhan (2011), and Şen (2009), it was observed that the participants’ critical thinking skills were moderate.

The second question of the research is: “Do the teachers’ critical thinking skill levels change by subject, gender, and experience?” When the teachers’ scores of CCDTI subcategories are analyzed, it is observed that the male teachers’ mean score is significantly higher than the female teachers in the subcategories of open-mindedness, inquisitiveness, and maturity of judgment. Consequently, the male teachers’ mean of the total score is significantly higher than the female teachers’ mean of the total score. According to this result, it can be indicated that male teachers’ critical thinking skill levels are more positive than the female teachers’ critical thinking skill levels. On the other dimensions, the significant difference regarding the gender variable is not observed. This finding is also supported by the research of Caldwell (2012) and Emir (2013). Based on their findings, the teachers’ critical thinking skill levels are different in other studies in the literature. When the teachers’ critical skill levels are analyzed based on the teachers’ subjects, Turkish language teachers’ mean score of the subcategories of systematicity, analyticity, inquisitiveness, CT self-confidence, and maturity of judgment is the highest. Mathematics teachers get the lowest mean score in the subcategories of truth-seeking, analyticity, systematicity, and maturity of judgment. In terms of the total score, Turkish language teachers get the highest, and the primary school teachers get the lowest score. Any significant difference is not observed in the analysis of the test, which is made to test if there is a meaningful difference. Therefore, Turkish teachers’ critical thinking skills level is significantly high. The reason for this high score might be the Turkish teachers’ effort on students to do analysis synthesis through Turkish texts. Nosich (2013) defines the importance of analysis synthesis in critical thinking. On the other hand, Wood (2002) keeps the analysis-synthesis equivalent to critical thinking. When the results of other research about critical thinking (Holley & Boyle, 2012; McCrae, 2011) are analyzed, the participants’ mean score is high based on their subjects.

As a result of the analysis of the teachers' critical thinking skill levels based on their experience, teachers who have 15 years of experience get the highest mean score in the subcategories of truth-seeking, open-mindedness, CT self-confidence, and maturity of judgment. Teachers who have 16 or more years of experience get the lowest mean of the total score. When we look at the total score, teachers with 11-15 years of experience get the highest, and the 16 years and over teachers get the lowest scores. According to the results of the analysis of tests, which are made to understand if the difference is significant, the difference in the experience variable is not significant. Therefore, experience difference does not affect the teachers' critical thinking skill levels. However, the fact that teachers with 16 or more years of experience got the lowest point in total score shows that teachers cannot improve or they disregard the importance of critical thinking skills over the years. On the other side, there are some studies (Caldwell, 2012; Korkmaz, 2009) that show that experience does not affect critical thinking skills.

The third question of the research is: "How do the teachers conceptualize critical thinking?" It was observed that the teachers defined critical thinking under these codes: independent thinking, criticism, looking from different perspectives, interrogating, interpreting, building logic, making inferences, learning to think, evaluating, and inquisitiveness. It was also seen that the participants defined critical thinking mostly with these characteristics: looking at the events from different perspectives, criticism, and independent thinking. Teacher participants' definitions of critical thinking are familiar with the definitions in the literature. The critical thinking definitions in the literature are under these codes: analysis synthesis, building logic, judging, evaluating, and independent thinking (Başoğlu & Mutlu, 2012; Nosich, 2013). In the research conducted by Yeşilpınar (2011), which conceptualizes the critical thinking of primary school teachers and prospective teachers, critical thinking is defined mostly under these codes: interrogation, interpreting the information, intellectualizing, and looking from different perspectives and opinions.

These results support the findings of this study. However, the study found that teachers never addressed concepts considered important in critical thinking such as problem-solving, adjourning judgment, and intellectual skepticism. Some participants expressed "critical thinking" differently from the definitions in the literature. Accordingly, the participants expressed "critical thinking" in the form of stating the negative aspects of a situation and being treated with leniency while stating these aspects. This can be cited as proof that teachers have not fully assimilated the concept of critical thinking. In order to describe how teachers conceptualize critical thinking, teachers' in-class practices for teaching critical thinking were also studied. According to the findings, the approaches preferred by teachers toward the learning and teaching process related to critical thinking skills are limited to four themes: methods and techniques, real-life relevance, classroom environment, and pre-learning. When we consider method and techniques, it is observed that the participants prefer these approaches: six thinking hats, discussing method, cause-and-effect relation, brainstorming, wh-questions, question and answer method, and group work. When the literature (Fung & Howe, 2012; Hove, 2011) was analyzed, the adopted approaches in teaching critical thinking were wh-questions, discussing, questioning, brainstorming, associating with daily life, six thinking hats, and group work. Therefore, it can be said that some of the teachers' preferences are consistent

with the literature. It was determined that the most preferred approach of teachers in teaching critical thinking skills was the “question-answer” method. This can be explained by the fact that this method is easy, economical, and customary. In the literature (Semerci, 2010; Yeşilpınar, 2011), it is stated that teachers’ most preferred approach toward critical thinking teaching in the classroom is the question-answer method. In this research, it is observed that the teachers in all subjects preferred the item of “encouraging students to ask and answer and discussing the topic.” It is observed that all these obtained findings support each other. The least preferred items are “cause-and-effect relation,” “activating the pre-learning,” and “group work.” It is thought-provoking that teachers move to a new subject without questioning pre-learning.

In the “closeness to real life” theme, the participants preferred these approaches: “making the students discover,” “develop empathy,” and “associating with daily life.” It was determined that the participants were more likely to associate teaching critical thinking with “associating with daily life.” Thus, topics become more permanent when they are associated with daily life (Göçmençelebi & Özkan, 2009). Paul and Elder (2006) stated the teachers’ mission on teaching critical thinking as follows: “Given examples of how the subject is applied to daily life, students will understand that what is acquired are tools for improving the quality of life of education.” This finding of the research is consistent with the other studies’ results (Cosgrove, 2013; Hove, 2011). In the observations of this research, it was seen that “asking the students to give daily life examples about the topic” is applied by more than half of the teachers. Therefore, it can be said that the teachers associate critical thinking with daily life.

In the classroom environment theme, the participants’ opinions about critical thinking are coded as “creating a free environment” and “ensuring a sense of self-confidence.” It is observed that teachers’ opinions are concentrated more on the “creating a free environment” theme. This case makes the topic more understandable. Therefore, it can be said that teachers’ opinions incline in this direction. As the literature suggests (Aktaş, 2013; Facione, 1990), the points “removing obstacles,” “providing a free environment,” and “ensuring a sense of self-confidence” are regarded as important elements.

Teachers’ pre-lesson preparations were analyzed to describe their process of conceptualizing critical thinking. According to the findings of the analysis, the teachers follow these preparations: using interactive materials, analyzing the guidebooks, using visual aids, analyzing the output, using the secondary resources, and following the agenda. It is observed that the teachers mostly preferred the “using interactive materials” theme, and the least preferred is the theme of “analyzing the guidebooks.” It is observed that all the teachers in the observation have technological facilities in their classrooms; therefore, it can be said that they mentioned “using the technological materials” theme frequently. The reason for asking this question is to find out whether teachers have a preparation process before they deliver their lessons. For this reason, it is assumed that following the agenda, using visual aids, and analyzing the guidebooks will contribute the teaching critical thinking skills. It is also observed that “using visual aids related to the topic” has a score of 78 percent in the research observations. Altınçelik (2009) stated that referring to visual aids widely during the understanding process of a complicated topic provides great advantages. These findings support this research’s results. Another point

to note here is the limited level of the teachers' guidebook usage. It can be said that a teacher who does not analyze guidebooks cannot be aware of which learning objective should be adopted in the topic. When we analyze the related literature results (Adıgüzel, 2010; Yeşilpınar, 2011), it is observed that they do not support the research's finding. For example, Adıgüzel (2010) states that the guidebooks and lesson books are always analyzed by the teachers. Studies by Cosgrove (2013) and Nosich (2013) pointed out that previous negative experiences, showing no renewal efforts, and the belief of having more knowledge than delivered knowledge are the biggest obstacles in teaching critical thinking. These explanations support this research's findings. Thus, the teachers' answer "...since we have the experience of teaching, we do not concentrate on the preparation process of the lesson as we used to do before" for the third question of this research should be considered.

The teachers' opinions about guidebooks were analyzed to determine teachers' conceptualizing critical thinking. These opinions about guidebooks are expressed as in these statements: "they need to be improved," "they are limiting the teachers," "they are guiding the teachers." The theme of "they are guiding the teachers" stood out while the theme of "they are limiting the teachers" was expressed least among the opinions. This finding of the research shows a similarity with some other research findings (Ayvaci & Çoruhlu, 2011; Bulut, 2013). For example, Ayvaci and Çoruhlu (2011) concluded that teachers like the activities in teachers' guidebooks. Teachers who do not analyze the guidebooks but find them useful are interesting. The expressed opinions conflict with one another. The reason for this is the insufficient analysis of guidebooks caused by the usage of interactive materials.

Teachers' suggestions on teaching critical thinking skills were also analyzed to determine how the teachers conceptualize critical thinking. The teachers reported these ideas: giving self-confidence, guidance, curriculum alleviation, preparing the evaluation tools on critical thinking, and enriching the resources. The theme of "giving self-confidence" stood out most, and the theme of "curriculum alleviation" was expressed least among the suggestions. These results coincide with other research results (Semerci & Yelken, 2010; Yeşilpınar, 2011). When we analyze the literature (Hove, 2011; Nosich, 2013), it is pointed out that it is essential to give self-confidence and guidance to the students to teach them critical thinking. The participants presented the same opinion, "giving self-confidence to the students," in the classroom environment theme. In the research, the items of "adopting a tolerant environment and avoiding authoritarian and oppressive environment" and "encouraging the students to participate in discussions and to question" were observed in all subjects. These findings are consistent with each other.

The fourth question of the research is: "What are the classroom applications or activities about critical thinking?" To answer this question, the Teacher Observation Form was used. The items of "adopting a tolerant environment and avoiding authoritarian and oppressive environment" and "encouraging the students to participate in discussions and to question" are observed in all subjects. Also, the items of "mentioning the topic's main and sub-ideas and also its problems," "making the students think about event results based on reality and theory," "encouraging the students to compare and to evaluate the different ideas," and "interrogating

the reliability of the resources (teacher, visual aids, books, etc.)” are observed not more than 85 percent.

When we analyze the observation form as a whole, it is seen that 19 of 28 items were applied more than 50 percent, but the other nine items are not applied more than 50 percent. According to this result, it can be said that teachers included teaching critical thinking in their lessons.

The fifth question of our research is: “How much space is given to what items on the critical thinking skills in the curriculum?” To answer this question, Turkish language, mathematics, science and technologies, social studies, and life science curricula and guidebooks were analyzed. According to the findings of this analysis, it can be indicated that there are many activities and exercises about critical thinking in the curriculum. There are some previous studies about how much space is given to critical thinking in the curriculum (Aktaş, 2013; Başoğlu & Mutlu, 2012). When the research results are analyzed, it is observed that the curriculum’s objectives are suitable to teach critical thinking skills.

The results of the study can be summarized in five items. The first is that the critical thinking skills of teachers are moderate. Second, critical thinking skill levels of male teachers are significantly higher than female teachers in open-mindedness, inquisitiveness, maturity dimensions, and in the total score. According to the subject variable, critical thinking skill levels of Turkish teachers are significantly higher than math and primary school teachers in analyticity, systematicity, self-confidence dimensions, and in the total score. Critical thinking skill levels are not significantly different according to the experience variable. Third, it was concluded that teachers define critical thinking terms considerably by the theoretic literature and that the approaches they prefer about the instruction of critical thinking skills are substantially matched with the approaches expressed in the literature. It was also determined that teachers prefer to benefit from contemporary topics, interactive materials, guidebooks, visual materials, secondary sources, and objectives for pre-course preparation. Next, teachers included teaching critical thinking in their courses to a great extent. Consequently, curriculums’ and teachers’ guidebooks consist of activities for critical thinking skills in an intense way.

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