

# Critical Thinking Tendencies of Geography Teacher Candidates in Turkey

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**Abstract** The purpose of this research is to determine the critical thinking levels of geography teacher candidates. The research was descriptive and conducted in a relational survey model. The population of this study consists of students of the geography department of Karadeniz Technical University, Atatürk University and Marmara University education faculties located in Turkey. The sample group constitutes 246 teacher candidates randomly selected from this universe. Californian Critical Thinking Disposition Inventory (CCTDI) consisting of 6 dimensions and 51 items which is a Likert type measurement with 6 points was used for data collection. The scale consists of analyticity, open-mindedness, inquisitiveness, self-confidence, truth-seeking and systematicity. Study variables such as gender, teaching experience, grade level and the type of high school graduated from were analyzed using SPSS 16 software using ANOVA and t tests. The data obtained in the study were collected during the fall semester of the academic year 2014-2015. The significance of the data was tested on the basis of .05 level. Considering the subscale averages of the scale, it is seen that geography teacher candidates' analyticity is 4.50, open-mindedness 3.25, inquisitiveness 4.42, self-confidence 4.06, truth-seeking 3.65, and systematicity 3.52. According to the result of the research; it is concluded that geography teacher candidates have a low level of critical thinking tendencies.

**Keywords** Critical Thinking, Critical Thinking Tendency, Geography Education, Teacher Candidates

## 1. Introduction

What is critical thinking? The word "critical" is derived from the Greek term "kritikos", which expresses the meanings of evaluation, judgment and identification. It is passed on to the Latin as "criticus" and passed through other languages in this way. Critical thinking is a rich concept that has been developing throughout the past 2500 years, starting

from ancient Greek thinkers Socrates, Plato, Aristotle and the Greek skeptics [1]. Examining the literature on critical thinking, it seems that there is no consensus on the definition of the concept. Many educators have not even reached agreement on terminology [2]. While developing ideas on critical thinking concepts, from education to philosophy, from psychology to political science, the concept has been tried to be based on two main disciplines such as philosophy and psychology. The philosophical approach focuses on the norms of good thinking, the concept of human thought and the mental skills necessary for a realistic, unbiased worldview. Psychological approaches focus on experimental work based on thoughts and thinking, individual differences in learning complex ideas and the concept of problem which is part of critical thinking, and critical thinking is treated as a mental process [3]. Because of this duality, there are many definitions of critical thinking in literature. Chance [4], defines critical thinking as a whole of analyzing facts, generating and organizing ideas, defending opinions, making comparisons, drawing inferences, evaluating arguments and solving problems. Halpern [5] expresses critical thinking as a form of thinking which is a combination of skill and strategy. Glaser [6] defines three components of critical thinking as follows "(1) an attitude of being disposed to consider the problems and subjects that come within the range of one's experiences in a thoughtful way, (2) knowledge of the methods of logical inquiry and reasoning, and (3) some skills in applying 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". Elder [7] identifies "critical thinking is self-guided, self-disciplined thinking which attempts to reason at the highest level of quality in a fair-minded way". Ennis [8] defines critical thinking as reasonable reflective thinking which focuses on deciding what to believe or do.

We can tell from the definitions made that critical thinking is the disciplined mental activity of evaluating arguments or propositions and making judgments that can guide the development of beliefs and taking action. Critical thinking is one of the most important attributes for success in the 21st

century. As the world is becoming increasingly complex, teachers and students need to think more critically. Therefore, it is important that students have critical thinking ability and a flexible thinking structure. So that they can develop their ability to quickly understand, solve and overcome the problems they constantly face. But that is not enough exclusively. Students must be supported by the teachers who can guide them and have the needs of critical thinking, while looking for new answers and solutions to the problems that they have encountered. According to Wilks [9], schools must ensure that teachers have these competences in order to be able to train students who are well-interrogated, more involved, more open to debate, predicting predictions and priorities, seeking alternatives, understanding diverse views, critical thinking and practicing practitioners. In developed democratic societies, it is expected that individuals might be sensitive to problems, socially responsible, distant from any kind of dogmatic thoughts, effective, knowing and wanting participation, capable of intelligent participation, able to create their own thoughts, interrogate other thoughts from the aspect of consistency on negotiable with data and proof; those who have an interest in empathy, discussion and reconciliation can question and evaluate in terms of consistency and robustness. So, not only the positive contributions of the teachers in creating a critical thinking society but also the positive role of the families, media, and the political authority should be taken into consideration.

In the Turkish education system, there are some common skills aiming to get all of the teaching programs. Critical thinking skill is one of these high level skills [10]. Today, the development of critical thinking skill is seen as an important goal in all levels of education from primary school to university. It is aimed to develop critical thinking skills in the geography program prepared by Ministry of Education in 2005. In particular emphasis is placed on creating environments in which students will solve the problems they encounter to compare real life problems and contradictory situations, and to use the knowledge and skills. For example, it aims to acquire skills and ways of thinking that students will solve by thinking critically about the problems of analysis, synthesis and evaluation by aiming at real-life related issues such as solving an environmental problem or discussing the decision of closure of a factory [11]. The school should be able to provide the necessary equipment and qualifications for the students to be able to be unique and free individuals. So, critical thinking is not a suddenly improved and occurred ability; it is a feature which is maintained or developed in families, in daily life, on the streets, in other parts of the society and at school. In short, critical thinking is an ability which shows parallelism with maturity and richness of life.

Geography teachers who are the organizers of educational environments in gaining critical thinking skills have important duties such as knowing the subject well, helping and encouraging students thinking critically, creating and organizing the learning environment accordingly.

## 2. Objectives of the Study

Geography teachers should be the active producers of knowledge and the right users of information, aiming to acquire, compare, use and evaluate knowledge in a unique way as a one-way thought will lead to a very fixed idea rather than developing the individual. Although teachers have the necessary knowledge and skills, if they do not support critical thinking with their attitudes, the power to arouse critical thinking will be lack. For this, it is necessary to find out the geography teacher candidates' critical thinking tendencies for the future of geography education in Turkey. Therefore, the purpose of this research is to examine geography teacher candidates' critical thinking and inquiry tendencies in terms of various variables.

## 3. Method

### 3.1. Research Design

This study is descriptive and has been conducted in a relational survey model. Karasar [12] identified the relational survey model as a model aimed at determining the existence and degree of the mutual exchange between two or more variables.

### 3.2. Study Population and Sample

The population is comprised of students studying at the Faculties of Education of the universities of Atatürk, Karadeniz Technical and Marmara. A total of 246 pre-service teachers who participated in the study were selected from these universities by using random sampling. The sample of the study is comprised of 32 1st, 79 3rd, 97 4th, 38 5th grade pre-service teachers. 81 candidates are females and 165 are males. The 95 percent of teacher candidates are between 17-23 years old and 5 percent are over 23 years old.

### 3.3. Data Collection Tool

Californian Critical Thinking Disposition Inventory was used to measure the geographical teacher candidates' critical thinking tendencies for data collection. CCTDI which was originally developed by Facione and Giancarlo [13] and adapted to Turkish by Kökdemir [14] was used to measure the geographical teacher candidates' critical thinking tendencies. The scale consisting of 6 dimensions and 51 items is a Likert type measurement with 6 points. (1 never agree, 2 disagree, 3 partly disagree, 4 partly agree, 5 agree and 6 fully agree.). It has sub-dimensions of analyticity with 12 items, open-mindedness 11 items, inquisitiveness 9 items, self-confidence 6 items, truth-seeking 7 items and systematicity 6 items. The negative items in the scoring of the scale (5,6,9,11,15,18,19,20,21,22,23,25,27,28,33,36, 44,43,45,47,49,50) have been reversed. In order to test the

reliability of the scale, the Cronbach Alpha coefficient was found to be .79 in the pilot study with 102 prospective teachers. If each dimension has internal consistency coefficients (alpha); analyticity and systematicity .77; search for inquisitiveness and truth-seeking .79; self-confidence .75; open-mindedness .76. The responses to the adapted scale were collected and the raw scores for each subscale were calculated and these raw scores were divided by the number of questions and then multiplied by 10 to convert them to a standard value with a minimum value of 6 and a maximum value of 60. The lowest and highest possible values for all subscales are fixed [13 as cited in 14], and those that are lower than 40 (or 4) for each subscale have a lower critical thinking tendency in that dimension, and those that are higher than 50 (Or 5) upscale people tend to have a high degree of critical thinking.

### 3.4. Data Analysis

The data of the study were collected during the fall semester of the academic year 2014-2015. Obtained data were analyzed by ANOVA and t tests in the SPSS 16 software (Statistical Packet for Social Sciences) and the significance of the data was tested on the basis of .05 level. The use of parametric tests in data analysis is related to the normal distribution of data and homogeneity of variants.

## 4. Findings, Comments and Discussion

In this section, it has been tried to determine, interpret and discuss the tendency of the geography teacher candidates to think critically on the basis of some variables. Findings related to the descriptive analysis results of the mean critical tendency scores of the geographical teacher candidates' total and subscale scores are shown in Table 1.

As can be seen in Table 1, the average score with a tendency to think critically on geography teacher candidates was found to be 3.93. According to the measure laid down, this score indicates a low tendency to think critically. When we look at the subscale averages of the scale, it is seen that geography teacher candidates' analyticity is 4.50, open-mindedness 3.25, inquisitiveness 4.42, self-confidence 4.06, truth-seeking 3.65, systematicity 3.52 and critical thinking tendencies are not high. As a result, the findings show that geography teacher candidates generally tend to have a low level of critical thinking. In the sub-dimensions of

critical thinking, open-mindedness, truth-seeking and systematicity; it is not seen that there is a high tendency of critical thinking as seen in analytical, inquisitiveness, and self-confidence sub-dimensions. In general, teachers seem to have the highest attitude in the sub-dimension of analyticity [14], which expresses the tendency to be mindful of potentially problematic situations and to use reasoning and objective evidence even in the face of difficult problems. However, it seems they have the lowest tendencies in terms of open-mindedness [14] sub-dimension, which expresses tolerance towards different approaches and sensitivity to their own mistakes, not only in their own thoughts but also in others' views and thoughts.

In the research conducted by Saçlı and Demirhan, [15]; Korkmaz [16]; Kürüm [17], it has been determined that teachers' tendencies and levels of critical thinking are generally low or moderate. In some other studies which have been carried on candidates trained in the faculty of education, the result was again that the critical thinking skills of the teacher candidates were low or inadequate [18, 19, 20]. The findings of all these studies support each other's results. Based on these results, it can be said that the tendency of critical thinking of undergraduate students and prospective teachers is not at the expected level. In the study of Korkmaz [21], it has been determined that the education given in the Faculty of Education does not contribute enough to the students' critical thinking tendencies and levels. On the other hand, it has been pointed out that the given education is so theoretical that students are generally passive in learning-teaching environments, multiple choice questions are often preferred in assessment activities, and less time is allocated for activities requiring analysis, synthesis and evaluation skills and similar applications. Based on the Illinois Learning Standards, Recalde [22] investigated whether there was a meaningful relationship between teachers' critical thinking skills and classroom activities. Research results show that although teachers have high critical thinking skills, it turns out that critical thinking skills do not resemble Illinois teaching standards and teaching practices, they do not reflect critical thinking skills into class activities, and they cannot pass critical thinking capacities to students, even though they receive high scores in critical thinking skills. This result does not only mean that it is important for prospective teachers to have critical thinking skills, but it also reveals that it is important to use and reflection of these skills practically.

**Table 1.** Descriptive Analysis Results of Geographical Teacher Candidates' Mean Critical Tendency Points toward the Total and Sub-Dimensions of the Scale

	N	Minimum	Maximum	Average	Standard Deviation
Total tendency scores	246	2.57	6	3.93	.483
Analyticity		2.50		4.50	.624
Open-mindedness		1.27		3.25	.833
Inquisitiveness		2.33		4.42	.748
Self-confidence		1.67		4.06	.798
Truth-seeking		1.14		3.65	.848
Systematicity		1.67		3.52	.684

**Table 2.** T-Test Analysis of Geography Teacher Candidates' Critical Thinking Trends by Gender

Dimensions	G.	N	Av.	S	sd	t	P
Total tendency scores	F.	81	3,92	,550	244	,161	,872
	M.	165	3,93	,447			
Analyticity	F.	81	4,47	,656			
	M.	165	4,51	,610			
Open-mindedness	F.	81	3,26	,901			
	M.	165	3,24	,801			
Inquisitiveness	F.	81	4,38	,841			
	M.	165	4,44	,700			
Self-confidence	F.	81	4,02	,842			
	M.	165	4,07	,778			
Truth-seeking	F.	81	3,67	,962			
	M.	165	3,64	,789			
Systematicity	F.	81	3,54	,771			
	M.	165	3,51	,639			

**Table 3.** T Test Analysis of Critical Trends of Geography Teacher Candidates According to Their Teaching Experience

Dimensions	Teaching Experience	N	Av.	S	Sd	t	P
Total tendency scores	Yes	123	3,96	,496	244	,86	,390
	No	123	3,90	,470			
Analyticity	Yes	123	4,47	,612			
	No	123	4,52	,639			
Open-mindedness	Yes	123	3,29	,870			
	No	123	3,21	,795			
Inquisitiveness	Yes	123	4,47	,734			
	No	123	4,37	,761			
Self-confidence	Yes	123	4,05	,76			
	No	123	4,06	,83			
Truth-seeking	Yes	123	3,68	,82			
	No	123	3,62	,87			
Systematicity	Yes	123	3,61	,69			
	No	123	3,42	,66			

\*p<.05 level of significance

As can be seen in Table 2, it was determined that the teachers' critical thinking tendencies did not show a statistically significant difference in terms of gender, both in terms of scale and subscales. It is seen that the highest mathematical mean is the Inquisitiveness and the lowest is the open mindedness. However, there have been different findings about whether the gender dimension of critical thinking is a predictive variable in many studies conducted both in Turkey and abroad on critical thinking.

There are many research findings claiming that gender is not a decisive factor in critical thinking power [2, 17, 21, 23-27]. However, Crawford [28] suggests that these two groups should be considered homogeneous, and that the difference is due to the factors that require mutual interaction, regardless of differences in the talks and discussions between men and women. In particular, he pointed out that school experience may be one of these factors.

In the study of language classes carried on by Faciona, Faciona and Giancarlo [13], CCTDI was used and it was found that scores of female students who speak English and Spanish in the open minded and analytical subscales significantly differed from male students' scores. Also, in some research on critical thinking dimensions, it has been shown that the use of critical thinking skills is significantly

higher for women than men and that there are significant differences for female candidates [18, 29, 30].

As can be seen in Table 3, the geographical prospective teachers candidates' critical thinking tendencies show a significant difference only in the systematicity sub-dimension and in favor of those with teaching experience, according to the teaching experience cases,  $t(244) = 2,143$ ;  $P < .05$ . Significant differences in the systematic sub-dimension can be considered as a result of geography teacher candidates' regular follow-up of their teaching experience courses. It is seen that the highest mathematical mean is the inquisitiveness and the lowest is the open-mindedness. This finding suggests that geography teacher candidates are curious about acquiring different information and learning new things; but they can be interpreted as being closed to differences and open to new ideas. This situation can be considered as a result of not being confronted with different ideas other than memorizing information of teacher candidates in the educational environment. The research of Korkmaz [21] supports this interpretation. In general, when the information in table 3 is interpreted; It can be concluded that the teaching experience courses do not contribute to the critical thinking skills of the prospective teachers positively except the sub-dimension of

systematicity and therefore the need for the development of the critical thinking skills of the prospective teachers in the teaching practice courses should not be ignored. As a result of Tsui's [31] research with university students, he pointed out that the lessons the students had and the problems they had with the exam, their interaction with the teacher in class had an impact on the cognitive skills and critical thinking skills of the students. From this point of view, there is no significant difference between the tendencies of critical thinking of prospective teachers with and without teaching experience. Tsui's activities can be interpreted as not being adequately confronted with teacher candidates.

Narin, [32] in her study which is conducted for examining Social Studies teachers' critical thinking tendencies and teaching methods used for critical thinking in terms of some

variables, concluded that teachers have a tendency to think critically at a high level, but the results of interviews do not fully support this finding. Nevertheless, there was no significant difference between social studies teachers' critical thinking tendencies and in-service training seminars. Kong [33] investigated the effects of teacher candidates' critical thinking tendencies towards pre-mission turnover in their work on teacher candidates at the Singapore National Institute of Education. As a result of the research, the CCTDI instrument was applied to the subject group, and it was determined that critical thinking scores were close to all of the subject group members. In Kong's study, it can be interpreted that the critical thinking scores of the teacher candidates are high because of the reasons stemming from teacher training systems.

**Table 4.** Analysis of Anova Test of Geography Teacher Candidates' Critical Thinking Trends by Grade Level

Dimensions	Grade Level	N	Average score	Standard Deviation
Total tendency scores	1	32	3,94	,470
	3	79	3,96	,447
	4	97	3,94	,528
	5	38	3,83	,448
	Total	246	3,93	,483
Analyticity	1	32	4,52	,643
	3	79	4,58	,540
	4	97	4,41	,686
	5	38	4,53	,603
	Total	246	4,50	,624
Open-mindedness	1	32	3,15	,739
	3	79	3,27	,860
	4	97	3,36	,843
	5	38	3,01	,799
	Total	246	3,25	,833
Inquisitiveness	1	32	4,45	,802
	3	79	4,48	,704
	4	97	4,39	,761
	5	38	4,34	,776
	Total	246	4,42	,748
Self-confidence	1	32	4,18	,742
	3	79	4,13	,856
	4	97	4,00	,809
	5	38	3,95	,686
	Total	246	4,06	,798
Truth-seeking	1	32	3,76	,850
	3	79	3,62	,921
	4	97	3,73	,804
	5	38	3,43	,781
	Total	246	3,65	,848
Systematicity	1	32	3,43	,623
	3	79	3,46	,719
	4	97	3,58	,690
	5	38	3,55	,652
	Total	246	3,52	,684

**Table 5.** Comparison of Critical Thinking Trends of Geography Teacher Candidates in Terms of Lower Dimensions by Class Level

Dimension	Source of variance	Sum of squares	Sd.	Squares Mean	F	P
Total tendency scores	Between groups	,43	3			
	Within groups	56,74	242	,145 ,234	,618	,604
	Total	57,17	245			
Analyticity	Between groups	1,35	3			
	Within groups	94,33	242	,453 ,390	1,162	,325
	Total	95,69	245			
Open-mindedness	Between groups	3,61	3			
	Within groups	166,63	242	1,204 ,689	1,749	,158
	Total	170,24	245			
Inquisitiveness	Between groups	,60	3			
	Within groups	136,59	242	,201 ,564	,356	,785
	Total	137,19	245			
Critical thinking Self-confidence	Between groups	1,68	3			
	Within groups	154,57	242	,562 ,639	,881	,452
	Total	156,25	245			
Truth-seeking	Between groups	2,97	3			
	Within groups	173,42	242	,991 ,717	1,383	,248
	Total	176,39	245			
Systematicity	Between groups	,87	3			
	Within groups	113,86	242	,292 ,471	,620	,603
	Total	114,73	245			

According to the results of the one-way analysis of variance, the tendency of the geographical teacher candidates to think critically was not statistically significant between the scale ( $F(3,242) = .618; p > .05$ ) and the sub-dimensions (Table 5). The highest mathematical mean of the total tendency scores is 3.9662 in the 3rd grade and the lowest average is in the 5th grade with 3.8395 (Table-4). It is seen that the 5th grade geography teacher candidates are expected to have a higher tendency to think critically than the candidates in the lower grades whereas the lowest mathematical average in open-mindedness, inquisitiveness, self-confidence and truth-seeking submissions is in 5th grade teacher candidates. It is seen that in the subscales of self-confidence and truthfulness, the mathematical averages of the first grades are higher than the other class grades. This finding can be interpreted as a result of having a positive impact on the confidence of the first year students to be a new university student.

Ekinci [34] concluded that the tendency of Critical Thinking did not differ according to the class levels in the named master's dissertation, examination of the Empathic and Critical Thinking Trends of the Teacher Candidates on 671 teacher candidates. Some other studies [35, 36] found no

significant relationship between the class and the critical thinking tendencies. Contrary to these researches, Saçlı and Demirhan's research [15] aiming at determining and comparing the critical thinking levels of the students who are educated in the Physical Education and Sport Teaching Program achieved the result that the critical thinking levels of the students in the first grade level are higher than the critical thinking levels of the students in the second, third and fourth classes. Again, in Zayıf's study based on [18] Primary School Teaching, Elementary Mathematics Teaching, Social Studies Teaching and Science Teaching Education Branches, 1st, 2nd, 3rd, on 502 prospective teachers who are studying in their classes; it was found that the teachers' tendency to think critically was significantly different from the class level to the total sum and to the analytical, self-confidence, and truth search sub-dimensions. It can be said that the use of different scales and study groups in researches may be the result of differences in research results. It is an expected finding that the level of richness of life and the level of critical thinking tendency increases with the increase of education level. However, in our research it has been found that the critical thinking tendencies of geography teacher candidates do not differ according to the class level they are

studying. The lack of courses to develop critical thinking tendencies in the curriculum and the lack of practice to develop critical thinking tendencies of teacher candidates in the current lessons can be considered as reasons for this result.

The analysis results for the determination of the relationship between the high school types graduated by geography teacher candidates and their critical thinking tendencies are shown below (table 6 and table 7).

**Table 6.** Anova Test Analysis of Critical Trends According to High School Types Graduated by Geography Teacher Candidates

Dimensions	Type of high school	N	Average	Standard deviation
Total tendencies.	General	137	3,96	,465
	Anatolia	84	3,88	,502
	Vocational	12	4,01	,423
	Others	13	3,87	,601
	Total	246	3,93	,483
Analyticity	General	137	4,53	,571
	Anatolia	84	4,43	,667
	Vocational	12	4,66	,440
	Others	13	4,41	,972
	Total	246	4,50	,624
Open-mindedness	General	137	3,26	,868
	Anatolia	84	3,26	,796
	Vocational	12	3,03	,548
	Others	13	3,23	,958
	Total	246	3,25	,833
Inquisitiveness	General	137	4,44	,672
	Anatolia	84	4,33	,828
	Vocational	12	4,71	,700
	Others	13	4,42	,980
	Total	246	4,42	,748
Self-confidence	General	137	4,05	,759
	Anatolia	84	3,99	,794
	Vocational	12	4,34	,952
	Others	13	4,29	1,056
	Total	246	4,06	,798
Truth-seeking	General	137	3,75	,860
	Anatolia	84	3,54	,845
	Vocational	12	3,58	,902
	Others	13	3,43	,604
	Total	246	3,65	,848
Systematicity	General	137	3,53	,731
	Anatolia	84	3,53	,639
	Vocational	12	3,61	,632
	Others	13	3,24	,454
	Total	246	3,52	,684

**Table 7.** Comparison of Critical Thinking Trends of Geography Teacher Candidates in Terms of Lower Dimensions According to High School Types Graduated.

Dimension	Source of variance	Sum of squares	Sd	Squares Mean	f	P
Total tendency s.	Between groups	,442	3			
	Within groups	56,735	242	,147	,628	,598
	Total	57,177	245	,234		
Analyticity	Between groups	,889	3			
	Within groups	94,806	242	,296	,756	,520
	Total	95,694	245	,392		
Open-mindedness	Between groups	,645	3			
	Within groups	169,602	242	,215	,307	,821
	Total	170,247	245	,701		
Inquisitiveness	Between groups	1,696	3			
	Within groups	135,497	242	,565	1,01	,389
	Total	137,193	245	,560		
Critical thinking Self-confidence	Between groups	2,095	3			
	Within groups	154,164	242	,698	1,09	,351
	Total	156,259	245	,637		
Truth-seeking	Between groups	3,072	3			
	Within groups	173,326	242	1,024	1,430	,235
	Total	176,399	245	,716		
Systematicity	Between groups	1,134	3			
	Within groups	113,604	242	,378	,806	,492
	Total	114,738	245	,469		

According to the results of the one-way analysis of variance, the tendency of the geographical teacher candidates to think critically is not statistically significant between the general ( $F(3,242) = .618; p > .05$ ) and sub-dimensions in terms of the high school types they graduated (Table-7). However, mathematical differences can be seen. As seen in Table 6, VET graduates' critical thinking tendencies are mathematically high (4,01), and the lowest mathematical mean appears to be in the category of other high school graduates (3,87). In this respect, there are other studies that parallel our findings [18,37]. The study of Korkmaz and Yeşil [16] found that the students who were in primary, secondary and higher education levels had a "medium" level of critical thinking. Also, it has been found that education at secondary level negatively affects students' critical thinking tendencies and levels; higher education provides positive contributions, but this contribution is not sufficient. According to the 15 years old students' creativity and critical thinking PISA test of OECD applied in 2015, the proportion of 15 years old students with advanced skills in critical thinking in Turkey is 2.2 percent and the average of OECD is 12 percent [38]. In our research, the conclusion that the

candidate teachers have low critical skills shows that the critical thinkers among the teacher candidates are not improved in the pre-university period.

In Zayıf's [18] study, by using the Californian Critical Thinking Tendency Scale, it has been found that the general critical thinking tendencies of prospective teachers did not differ significantly from those of high school types. On the other hand, it has been concluded that the tendency of teacher candidates towards critical thinking shows a significant difference in the sub-dimensions of open-mindedness, self-esteem, and truth-seeking according to the programs they have studied. The fact that the critical thinking levels of the teacher candidates do not show a meaningful difference compared to the high school types that they have graduated can be explained by the limited ability of the high school teachers to possess the skills of critical thinking, to use these skills and to transfer them to their students. As a matter of fact, in the research conducted by Şengül and Üstündağ [39] on 80 physics teachers working in 6 central districts of Ankara province, it was determined that physic teachers working in high schools, vocational high schools and Anatolian high schools have a low critical thinking tendency

level, and that tendency levels do not change according to school types.

## 5. Conclusions and Recommendations

In this section, the findings and suggestions reached in the direction of the findings of the research are given. When the findings obtained from the research are evaluated, the results can be summarized as follows:

### 5.1. Conclusions

1. Geography teacher candidates were found to have a low level of critical thinking tendencies.

2. There was no significant difference between geographical teacher candidates' tendencies to think critically by gender.

3. It has been determined that the geographical teacher candidates have a significant difference only in the systematic sub-dimension of their critical tendencies according to their teaching experience situations in favor of those with teaching experience.

4. It has been found that there is not a significant difference between the tendencies of critical thinking of geography teacher candidates and class levels.

5. There was no significant difference between the tendency of the geography teacher candidates to think critically and the high school types they graduated. However, mathematical differences are encountered. Vocational high school graduates have the highest mathematical tendency to think critically and lowest in other high school graduates.

### 5.2. Recommendations

Critical thinking skills should be taught on the basis of interdisciplinary approach and skill teaching [40,41]. Lan [42] notes that the development of these skills should be supported by giving them a separate lesson, such as Critical Thinking Teaching, or by developing activities to develop critical thinking skills in teaching other disciplines.

It is unlikely that underprivileged teachers of critical thinking skills will be able to raise the human model of the 21st century. For this reason, critical thinking education in universities should be given by specialists who teach these as a separate lesson to teacher candidates in order to ensure that geography teacher candidates acquire and develop these skills. Scholars who support the development of critical thinking ability of their students must also be individuals who can think critically and in this way need to be model for students, open to different types of knowledge and ways of thinking forms.

Critical thinking should be taught both at the theoretical level and practically in faculties of education in order to make geography teacher candidates gain critical thinking skills. In this context, it is suggested that the different lessons given in each grade of education should include activities

that will promote the development of critical thinking tendencies and levels. The other important dimension of developing critical thinking skills is the use of lessons such as philosophy, logic, sociology, media literacy, plastic arts, music and aesthetics in order to reorganize teacher training programs in line with modern pedagogical methods and developments in the contemporary world and to gain different thinking strategies and intellectual skills. In addition, the inclusion of approaches involving pluralistic, critical, reflective, analytical and many other aspects of the content of these courses will be useful in the formation of critical thinking in teacher candidates.

Unfortunately, many researches on critical thinking skills in Turkey are limited to schools and their constituents, students and teachers. It is therefore recommended that new researches to be done with the people and groups from different levels of society. It is necessary to investigate the critical thinking reflections on social and cultural life such as gender equality, gender, respect for differences, openness to innovations, etc.

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