The Effects of Microteaching on the Critical Thinking Dispositions of Pre-service Teachers

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Abstract: The purpose of this study was to examine the effects of microteaching on pre-service teachers' critical thinking dispositions. The participants of the study consisted of 70 pre-service teachers (64.3% females, 35.7% males) in the Turkish language teacher education program at a public university in the north of Turkey. In the study, an experimental and a control group and a pretest-posttest quasi-experimental design were used to determine the impact of microteaching on the critical thinking dispositions of the pre-service teachers in the teacher education program. The results revealed that the pre-service teachers in the experimental group showed statistically significant greater progress in terms of critical thinking dispositions than those in the control group. Teacher educators in teacher education programs should plan and implement microteaching in the pedagogical courses to improve pre-service teachers' critical thinking dispositions.

Introduction

There are many objectives related to critical thinking skills and dispositions in school programs (Bensley, 2011). Thus, it is important for teachers to improve the critical thinking skills of their students (Halpern, 2001; Schamber & Mahoney, 2006). Teachers who have critical thinking skills can better improve their students' critical thinking skills (Evans, 2008; Fullan, 2001). Therefore, teachers need to be models of critical thinking and to encourage students by sharing their knowledge, skills and beliefs (Herrenkohl & Wertsch, 1999; Ironside, 2006).

The report of the European Union (EU) Commission emphasizes the importance of high-level thinking skills for teachers. These skills include reflective, critical thinking and metacognition skills. The general teacher competences defined by the EU Commission include critical thinking skills and dispositions and are references for both the initial teacher education and the continuous professional development of teachers in Europe (European Commission, 2013). The teacher competences of the EU Commission are also references for teacher education programs in Turkey, which is a candidate member country for the EU. Furthermore, the general teacher competences defined by the Minister of National Education in Turkey include critical thinking skills and dispositions. For example, the following competence is directly related to the critical thinking skills and dispositions of teachers: "Teachers have a high level of thinking skills such as critical thinking and problem solving" (MEB, 2012, p.12). If pre-service teachers have critical thinking skills and dispositions while they are in the initial teacher education program, they can plan and implement future teaching activities that will improve their students' critical thinking skills and dispositions. Pre-service teachers can acquire critical thinking skills and dispositions through learning experiences planned by teacher educators (Paul, 1995). For this reason, it is important for teacher educators to design a teaching environment, implement teaching activities, use student-

centered teaching methods, and create a democratic classroom climate to improve the questioning and the critical thinking skills and dispositions of pre-service teachers.

Theoretical Framework of the Study

Critical Thinking

The concept of critical thinking is rich and open-ended. There are many ways to explain critical thinking. For example, critical thinking is self-guided and self-disciplined thinking that attempts to reason at the highest level of quality in a fair-minded way. Additionally, critical thinking means the art of analyzing and evaluating thinking with a view to improve it (Paul & Elder, 2014). Watson and Glaser (1980) defined critical thinking as a composite of attitudes, knowledge and skills. According to Ennis (1987), critical thinking is reasonable and reflective thinking that is focused on deciding what to believe or do. Critical thinking abilities include skills such as refining generalizations; avoiding over-simplifications; clarifying issues, conclusions, or beliefs; developing criteria for evaluation; analyzing or evaluating actions or policies; and reasoning dialogically (Nosich, 1995).

Critical thinking includes more than abilities. It also includes attitudes, dispositions, passions, and traits of mind (Paul & Elder, 2014). Villegas (2007) stated that dispositions are tendencies for individuals to act in a particular manner under particular circumstances. Critical thinking dispositions are tendencies toward patterns of intellectual activity that guide cognitive behaviors (Perkins, Jay & Tishman, 1993). Halpern (1998) stated that critical thinking dispositions include the following: "(a) willingness to engage in and persist at a complex task, (b) habitual use of plans and the suppression of impulsive activity, (c) flexibility or open mindedness, (d) willingness to abandon nonproductive strategies in an attempt to self-correct, and (e) an awareness of the social realities that need to be overcome." (p. 45). According to Facione and Gittens (2013), critical thinkers not only have critical thinking skills such as analyzing, self-regulation and self-evaluation but also have the affective dimensions of critical thinking, such as a willingness to suspend judgment and being open-minded, self-confident, and analytical—in short, having a willingness to engage in sustained critical thinking. Facione, Facione and Giancarlo (2000) define critical thinking dispositions as "a person's consistent internal motivations to act toward, or respond to, persons, events, or circumstances in habitual, yet potentially malleable ways" (p. 66). According to Facione and Gittens (2013), critical thinking dispositions include truth seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and maturity. A truth seeking person has intellectual integrity and a desire to find possible knowledge in any given situation by asking probing questions and following reason and evidence. An open-minded person is tolerant of different views and sensitive to possible biases. An analytical person tries to predict short-term and long-term results of events, decisions and actions. A systematic person identifies and solves problems in an organized way. A self-confident person trusts his or her reasoning skills to yield good judgment. An inquisitive person seeks to learn new things. A mature person has the cognitive maturity to realize that many questions and issues are not black and white and that at times, judgments must be made in a context of uncertainty. Critical thinking dispositions are as essential as critical thinking skills for both students and teachers.

Teacher educators who aim to improve the critical thinking skills of pre-service teachers should first determine these pre-service teacher's critical thinking dispositions (Underbakke, Borg & Peterson, 1993). Many studies have investigated the critical thinking dispositions of pre-service teachers (Abrami et al., 2008; Kezer & Turker, 2012; Mcbride,

Xiang & Wittenburg, 2002; Yenice, 2012; Zhou, Yan, Zhao, Liu & Xing, 2012). These studies showed that the learning experiences of pre-service teachers in teacher preparation programs are among the crucial factors affecting their critical thinking skills and dispositions (Abrami et al., 2008). Some empirical studies have examined the effects of learning experiences in teacher education programs on the critical thinking dispositions of pre-service teachers. In these studies, teaching activities related to critical thinking dispositions were integrated into the teaching and learning process or into the context of a course. For instance, Han and Brown (2013) integrated the concepts, elements, standards, and traits of critical thinking into the context of a course. They found that the critical thinking dispositions of pre-service teachers improved significantly by the end of the study. Qing, Jing, Yazhuan, Ting and Junping (2010) investigated the effects of an inquiry-based chemical experiment for pre-service teachers on critical thinking dispositions. Their results showed that the inquiry-based chemical experiment for pre-service teachers positively affected their critical thinking dispositions. Evrena, Bati and Yılmaz (2012) examined the impact of V-diagrams in a science and technology teaching course on the critical thinking dispositions of pre-service teachers. They found that the critical thinking dispositions of pre-service teachers in the V-diagram group were significantly different from those of pre-service teachers in the control group. Furthermore, studies have examined how integrating critical thinking teaching activities into the context of pedagogical courses in teacher education programs affects the critical thinking dispositions of pre-service teachers. For example, Toy and Ok (2012) examined the impact of a critical thinking-based pedagogical course on the content knowledge and critical thinking dispositions of pre-service teachers. In the study, they found that there was no significant difference between the critical thinking dispositions of pre-service teachers in the experimental group and those in the control group. The critical thinking dispositions of pre-service teachers can be improved when they have student-centered learning experiences, such as inquiry-based teaching and microteaching. Microteaching experience might improve pre-service teachers' critical thinking skills and dispositions.

Microteaching

Microteaching is an effective teaching method that is used for the professional development of pre-service and in-service teachers (Fernandez; 2005; Kpanja, 2001). Allen and Ryan (1969) stated that microteaching improves the teaching skills of pre-service teachers by reducing the complexity of the authentic classroom environment and limiting content, time, and the number of students. Popovich and Katz (2009) revealed that microteaching is a valuable tool for assisting students in developing communication, critical thinking and problem solving skills. Teacher educators can easily control many factors that influence the quality of teaching by means of microteaching.

The original model of microteaching developed by Allen and Ryan in 1969 consists of six interrelated stages. These stages are planning, teaching, observation and criticism, re-planning, re-teaching, and re-observation. At the planning stage, the teaching skills, behaviors, and evaluation standards that are expected from pre-service teachers during microteaching are planned by the teacher educator. The teacher educator presents a model lesson plan. The pre-service teachers plan their teaching activities for microteaching. At the teaching stage, the pre-service teachers implement their lesson plan for 15 to 20 minutes. The teacher educator takes notes, observes and records the teaching activities of the pre-service teachers via a video recorder. At the observation and criticism stage, the video recorded teaching activities of the pre-service teachers are watched by the teacher educator and the other pre-service teachers in the class. The teacher educator generates a group discussion on

the teaching performance of each pre-service teacher. The teacher educator also provides feedback to the pre-service teachers about their teaching performance. At the re-planning stage, the pre-service teachers plan new teaching activities for a different or the same objective and subject by considering the feedback and suggestions of the teacher educator and the other pre-service teachers. At this stage, the pre-service teachers try to improve their teaching performance. At the last stage, the teacher educator observes and records the pre-service teachers' teaching performance. Finally, the teacher educator evaluates the teaching performance according to the teaching evaluation criteria. Moreover, the pre-service teachers evaluate their own teaching performance.

Since 1969, the beginning of the original microteaching process developed by Allen and Ryan, the implementation of microteaching for teacher education has changed. At the present time, the use of technological devices for microteaching can improve the teaching skills of preservice teachers (Savas, 2012). All of the teaching practice of preservice teachers can be recorded and later replayed for criticism by both the supervising teacher and the students with the aid of digital technology. As a result, preservice teachers have an opportunity to evaluate and improve their teaching performance (Kpanja, 2001).

Microteaching provides pre-service teachers with a connection between theory and practice and improves their teaching skills with regard to planning, implementation and evaluation (Fernandez, 2005; Gress-Newsome & Lederman, 1990). Numerous studies indicate that microteaching is an effective method for improving the teaching skills of pre-service teachers (Amobi & Irwin, 2009; Benton-Kuper, 2001; Fernandez & Robinson, 2006; Grossman, 2005). According to Bandura (1997), enactive mastery experience is one source of self-efficacy. The findings of studies on microteaching show that microteaching is effective in increasing planning, implementing teaching self-efficacy beliefs and reducing the teaching anxiety of pre-service teachers (Bell, 2007; Benton-Kupper, 2001; Huber & Ward, 2001; Mergler & Tangen, 2010; Peker, 2009). For example, Mergler and Tangen (2010) conducted an empirical study examining the effects of microteaching on the beliefs of pre-service teachers in their teaching self-efficacy. The findings showed microteaching to be more effective than traditional instruction in increasing self-efficacy beliefs. Pre-service teachers become anxious when they have an upcoming teaching experience in schools. Microteaching is effective in reducing the teaching anxiety of pre-service teachers (Peker, 2009). As a result, the studies show that microteaching positively affects the teaching competence of pre-service teachers.

Microteaching might positively affect pre-service teachers' teaching skills, self-efficacy beliefs, anxiety, and critical thinking skills and dispositions, which are all critical teacher education competences. Binker (1995) stated that Socratic discussion enables students to think critically. Group discussion activities in microteaching might increase the critical thinking dispositions of pre-service teachers. Furthermore, feedback from the instructor and sharing ideas among the pre-service teachers during the criticism stage of microteaching might affect the critical thinking dispositions of pre-service teachers. The aim of this study is to determine the effects of microteaching on pre-service teachers' critical thinking dispositions. The present study was prompted by the following main research question:

Is there a significant difference in the reported critical thinking dispositions between pre-service teachers who participate in microteaching and those who do not?

Method

Research Design

In the present study, an experimental group and a control group and a pretest-posttest quasi-experimental design were used to determine the impact of microteaching on the critical thinking dispositions of pre-service teachers in a teacher education program. The California Critical Thinking Dispositions Inventory (CCTDI) was administered to both groups at the beginning of the study as a pretest and at the end of the study as a posttest. Microteaching was planned and implemented by the researcher in the experimental group for one semester. The pre-post test CCTDI scores of pre-service teachers in both groups were compared to find out the effects of microteaching and time on the critical thinking dispositions of the pre-service teachers. The current study was conducted during the Methods of Teaching course, which is given in the fourth semester of the Turkish Language teacher education program. This course has objectives and topics related to teachers' knowledge of, skills in, and attitudes toward teaching. The instructor of the course was the same for both groups.

In 1981, in accordance with the new Higher Education Law, the administration of higher education in Turkey was restructured. The system became centralized, with all higher education institutions tied to the Higher Education Council (Higher Education Council, 2014). Teacher education was formed in the Faculties of Education, which offer 4-year undergraduate programs and are responsible to the Higher Education Council. In 1998, the National Committee on Teacher Education was formed with representatives from the Faculties of Education, the Higher Education Council and the Ministry of Education. In 2006, the Higher Education Council revised all of the teacher education programs that include Turkish Language Teacher Education (Kavak, Aydın & Akbaba Altun, 2007). The new teacher education programs consist of many subject area courses (e.g., linguistics, Turkish literature) and pedagogical courses (e.g., educational psychology, teaching methods). The Turkish Language Teacher Education program provided for preservice teachers includes subject area courses such as linguistics and Turkish language literature and pedagogical courses such as educational psychology, methods of teaching and classroom management to qualify them as teachers in elementary schools in Turkey. The preservice teachers of the Turkish Language Teacher Education program have school experience in their 7th semester, and they have teaching practice opportunity with students through the guidance of a mentor teacher in the 8th semester (Higher Education Council, 2007). Before the school experience, it is important for the preservice teacher to obtain teaching practice experience, and microteaching can provide practice that will improve their teaching skills. The new teacher education program emphasizes the importance of microteaching and uses it in courses such as School Experience and Teaching Practice.

Participants

The participants of the study consisted of 70 pre-service teachers (64.3% females, 35.7% males) enrolled in the Turkish Language teacher education program at a public university in the north of Turkey. The study sample was limited to 70 pre-service teachers who were enrolled in the Methods of Teaching course. Furthermore, none of the pre-service teachers had any microteaching experience in their previous school life. There were 35 preservice teachers in the experimental group in which microteaching was implemented, and there were 35 preservice teachers in the control group. The teachers were randomly selected for the experimental and control groups. All of the preservice teachers voluntarily participated in the study.

Data Collection Instrument

The California Critical Thinking Dispositions Inventory (CCTDI), which was developed by Facione, Sanchez, Facione and Gainen (1995), was administered to determine the levels of the critical thinking dispositions of pre-service teachers in the experimental and control groups at the beginning and end of the application. The scale was translated and adapted into Turkish by Kökdemir (2003). This scale has been used by many other researchers to assess teachers' and pre-service teachers' critical thinking dispositions (Kezer & Turker, 2012; Kökdemir, 2003; Mcbridge, Xiang & Wittenburg, 2002; Toy & Ok, 2012; Zhou et al., 2012). The original scale consists of 75 6-point Likert-style-ranking items with seven subscales: truth-seeking, open-mindedness, analyticity, systematicity, inquisitiveness, self-confidence and maturity. The Turkish version of the scale consists of 51 items with six subscales. The Turkish version of the scale confirmed the structure of the original scale, but open-mindedness and maturity were loaded on one construct. The reliability value of the scale was found to be 0.88. The reliability values of each subscale ranged from 0.61 to 0.78. Considering the total scores on the CCTDI, a score of 240 and below indicates a low CCTD, between 240 and 300 indicates a positive CCTD and a score 300 and higher indicates a high CCTD (Kökdemir, 2003).

Process

Instruction in the Experimental Group

The theoretical bases of the Methods of Teaching course, including the course objectives and content, were presented by the instructor using teaching methods such as explaining, question and answer, and discussion at the beginning of the study. Microteaching was conducted throughout the teaching practice. In the study, the original microteaching model cycle, developed by Allen and Ryan (1969), was implemented with the aid of technology. The cycle consists of six stages: planning, teaching, observation and critique, re-planning, re-teaching, and re-observation and critique. Each teaching episode took approximately 15 to 20 minutes, and the discussion session took approximately 10 minutes. The activities that were applied in each stage of the microteaching model are described below.

Planning: Before the microteaching, the purpose, principles, process, and sample activities of microteaching were presented by the instructor. At this stage, the teaching skills and performance standards considered in the evaluation criteria and the objectives of the microteaching were determined. The evaluation standards include teaching principles related to motivation, classroom management, teaching methods, materials and activities, and evaluation. The instructor presented a model lesson plan that included the desired teaching skills. The pre-service teachers specified an objective and a subject for the microteaching practice from the Elementary School Turkish Language Teaching Program. Each pre-service teacher designed a lesson plan to teach a particular subject of the Turkish language to elementary school students. The instructor guided the pre-service teachers in preparing their lesson plans. The schedule on microteaching implementation was designed by the instructor.

Teaching: At this stage, the pre-service teachers implemented their lesson plans. Other pre-service teachers in the classroom participated in the teaching activities by taking on the role of elementary school students. The microteaching implementation of each pre-service teacher was observed and video recorded by the instructor. Moreover, the instructor kept notes on the teaching of each pre-service teacher to provide feedback after the lesson.

Observation and Critique: At this stage, the instructor and the pre-service teachers watched the video recorded microteaching implementations. The instructor planned and

supervised group discussion sessions on the teaching performance of each pre-service teacher. The pre-service teachers in the classroom criticized the teaching performance of their peers according to the microteaching evaluation standards. Furthermore, the pre-service teachers gave their peers suggestions to improve their teaching performance. Both oral and written feedback was provided to the preservice teachers on their teaching performance. The instructor provided feedback to each pre-service teacher on their teaching performance by considering the video recording and the notes taken during the microteaching implementation. Furthermore, the instructor provided guidance to each pre-service teacher regarding problematic areas in his or her teaching performance.

Re-planning: At this stage, each pre-service teacher considered the feedback of the instructor and the suggestions of the other pre-service teachers and designed a new lesson plan for the same or for a different subject. The pre-service teachers tried to solve their teaching problems with the guidance of the instructor.

Re-teaching: At this stage, the pre-service teachers implemented their revised lesson plans with the same group of students. The revised teaching activities were observed and recorded by the instructor.

Re-observation and critique: At this stage, the instructor and the pre-service teachers watched and discussed the teaching performance of each pre-service teacher again. They evaluated the teaching performance of each pre-service teacher according to the microteaching evaluation standards. Furthermore, each pre-service teacher evaluated his or her own teaching performance. The instructor gave feedback to each pre-service teacher again.

Instruction in the Control Group

The theoretical dimensions of the Methods of Teaching course were presented by the instructor using teaching methods such as explaining, question and answer, and discussion at the beginning of the study. The pre-service teachers designed a lesson plan for an objective and a subject in the Elementary School Turkish Language Teaching Program. Teaching practice related to teaching methods was implemented with the guidance of the instructor; however, the pre-service teachers in the control group did not implement microteaching by assuming the teacher role. The instructor gave feedback about the pre-service teachers' teaching activities and the materials in their lesson plans. However, the instructor did not organize a discussion session on the lesson plans of the pre-service teachers.

Data Analysis

The Analysis of Covariance (ANCOVA) was conducted to analyze the effects of microteaching on the critical thinking dispositions of pre-service teachers. ANCOVA evaluates whether the population means of any dependent variable are equal across levels of a categorical independent variable by statistically controlling for the effects of other continuous variables that are not of primary interest, known as covariates (Keppel, 1991). In this study, the microteaching was the independent variable and the critical thinking dispositions were the dependent variable; the scores of the pretest were described as 'covariate' variables.

Results

The descriptive statistics of the CCTD pretest and posttest are given in Table 1:

Groups	Time	N	Mean Scores	Standard Deviation	Corrected Mean Scores
Experimental	Pre-test	35	188.14	34.12	
	Post-test	35	227.14	15.18	229.72
Control	Pre-test	35	208.66	20.33	
	Post-test	35	213.88	19.75	211.42
	Total	35	220.53	18.70	

Table 1: Means and standard deviations of the CCTD pre-test and post-test scores.

The results in Table 1 show that there was an increase in the post-test mean scores of the pre-service teachers' critical thinking dispositions in both the experimental and the control group.

The results of the ANCOVA are given in Table 2.

Source	Sum of Squares	df	Mean Square	F	p	μ^2
Group	5172.564	1	5172.564	19.39	.000	.225
Pre-test	349.312	1	3249.312	12.18	.001	,154
Error	17867.202	67	216.675			
Total	24205.443	70				

p<.05

Table 2: ANCOVA results for the effects of microteaching on the CCTD

The results in Table 2 show that there was a significant difference between the experimental and control groups in terms of their critical thinking dispositions at the end of the application in favor of the experimental group, $F(1.67) = 19.39$ $p< .05$ Partial $\mu^2 = .22$). Moreover, the effect size was very large. The covariate (pre-test) had a significant effect on the critical thinking dispositions, $F(1.67) = 12.18$ $p< .05$ Partial $\mu^2 = .15$. However, in this case, the effect size was small. The findings indicate that the use of microteaching in the experimental group was more effective in improving the critical thinking dispositions of the pre-service teachers than the teaching in the control group.

Discussion and Conclusions

The purpose of this study was to determine the effects of microteaching on the critical thinking dispositions of pre-service teachers. The results of the study revealed that the critical thinking dispositions of the pre-service teachers in both the control and the experimental groups increased. This might be related to the learning experiences in both groups of pre-service teachers. The findings of the current study showed that the critical thinking dispositions of the pre-service teachers in the experimental group increased to a statistically significant higher degree than that of the pre-service teachers in the control group. This

means that microteaching might affect the critical thinking dispositions of the pre-service teachers.

At the observation and critique stage of microteaching, the pre-service teachers in the experimental group had inquiry and group discussion experiences. The results of this study are consistent with the study of Qing et al. (2010), who found that inquiry-based experience is effective in increasing the critical thinking dispositions of pre-service teachers. Miri, Ben-Chaim and Zoller (2007) stated that group discussion affects critical thinking dispositions. Group discussion might have caused the considerable increase in the pre-service teachers' critical thinking dispositions, such as inquisitiveness about, open-mindedness to and respect for different ideas. They may learn to respect different ideas, equality, freedom, reasonable thinking, and self-evaluation when they are discussing a topic (Bridges, 1979; Hill, 1979; Ikuenobe, 2002). Group discussion activities in a positive classroom climate might have improved the critical thinking dispositions of the pre-service teachers in the experimental group.

The pre-service teachers in the experimental group shared their knowledge, ideas, and experiences with each other by means of discussion activities in microteaching. At the critique stage of microteaching, cooperation and the sharing of ideas on teaching performance among the pre-service teachers might be factors that contributed to the increase in their critical thinking dispositions. Fernandez and Robinson (2006) reported that the microteaching experience was beneficial for pre-service teachers because they collaborated and shared their experiences with each other. Karami, Pakmehr and Aghili (2012) found that cooperative group activities are effective in increasing the critical thinking dispositions of students. After the critique stage, pre-service teachers analyzed their teaching activities and performance, tried to solve problematic teaching activities, and systematically revised their lesson plans in light of the discussions. This might have increased dimensions of their critical thinking dispositions such as analyticity, truth seeking and systematicity.

The instructor provided feedback to the pre-service teachers in the experimental group regarding their teaching performance with the help of video recordings, which might be another factor that affects their critical thinking dispositions. Feedback is one of the most important factors in microteaching (Allen & Ryan 1969). Using the critiques and feedback from the instructor, the pre-service teachers in the experimental group had an opportunity to understand both positive and problematic teaching activities and used that understanding when they revised their lesson plans. Fernandez and Robinson (2006) reported that the instructor's feedback in microteaching is useful for enhancing the teaching skills of pre-service teachers. Moreover, feedback in microteaching leads pre-service teachers to find genuine teaching activities (Amobi & Irbın, 2009; Fernandez, 2005). Pre-service teachers in the experimental group systematically revised their lesson plans in light of the feedback from the instructor. As a result, feedback in microteaching might have played a role in the development of the pre-service teachers' systematic analytical thinking as a sub-dimension of critical thinking disposition.

In microteaching, the pre-service teachers in the experimental group had an enactive mastery experience in which they designed and implemented a lesson plan, including teaching activities and materials. These enactive mastery experiences (Bandura, 1997) might have increased their belief in their teaching self-efficacy, which in turn might have increased their critical thinking dispositions. Buck (2002) stated that people who have high self-efficacy beliefs have higher critical thinking dispositions (Boggiano et al., 1992). As a result, the higher critical thinking dispositions of the pre-service teachers in the experimental group might have related to their positive self-efficacy beliefs in teaching.

In conclusion, although there is evidence for the effect of microteaching on the critical thinking dispositions of preservice teachers, many teaching methods such as questioning,

group discussion, cooperative learning, and problem-based learning might also promote critical thinking dispositions (El-Shaer & Gaber, 2014; Walker, 2003). The findings of the study indicate that microteaching and this type of teaching method might be useful for increasing pre-service teachers' critical thinking dispositions. Critical thinking disposition represents one of the teacher education competences of the European Commission and National Education in Turkey. Teacher educators in teacher education programs should plan and implement microteaching and this type of teaching method in pedagogical courses to improve the critical thinking dispositions of pre-service teachers. In microteaching, group discussion activities, the pre-service teachers' sharing of experiences and collaboration with each other and the instructor might play a role in the improvement of their critical thinking dispositions. For this reason, teacher educators should use group discussion methods and group study to increase the critical thinking dispositions of pre-service teachers.

The improvement of the critical thinking dispositions of preservice teachers in the experimental group might depend on not only microteaching but also other factors; thus, there are a number of limitations to the current study that need to be addressed in future research. First, critical thinking disposition is complex and multidimensional (VanGelder, 2005). Many factors related to socio-cultural and personal factors might affect people's critical thinking skills and dispositions (Hatano & Wertsch, 2001; Nalcaci, 2012; Paul, 1995). Furthermore, pre-service teachers' learning experiences in other courses of the teacher education program might affect their critical thinking dispositions. All of these factors could not be controlled in an experimental study by researchers investigating the effects of microteaching on the critical thinking dispositions of pre-service teachers. However, teacher educators and researchers should consider microteaching to be one of the factors that improve such dispositions. Second, the critical thinking dispositions of pre-service teachers might be related to their teaching performance, anxiety, and self-efficacy beliefs. For this reason, researchers examining critical thinking dispositions should consider these factors as covariate variables in experimental studies. Finally, the current study is limited to pre-service teachers. There are significant differences between the critical thinking dispositions of pre-service teachers and those of in-service teachers (Zhou et al., 2012). Researchers should examine the effects of microteaching on the critical thinking dispositions of in-service teachers.

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