A Systematic Review of Research on Critical Thinking Skills of Teachers and Pre-service Teachers[1]

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Abstract

The aim of this study is to examine the research on the critical thinking skills of teachers and pre-service teachers using a systematic review methodology. The study includes 26 articles published in Turkey and abroad between 2013 and 2022, as well as 4 master's theses published in Turkey. The research was categorized according to the publication year, type, purpose, method/design, sample level, sample size, data collection tools, data analysis method, and conclusions/recommendations in accordance with the systematic review methodology. The study revealed an increase in research on the critical thinking skills of teachers and pre-service teachers before the pandemic, with a relatively decrease in research during the pandemic. Quantitative designs were largely preferred in the research, with scale-type data collection tools being the most frequently used. The California Critical Thinking Disposition Inventory, developed by Facione, was found to be the most commonly used scale to measure the critical thinking skills of teachers and teacher pre-services. While the objectives of the research were similar, the results differed. In conclusion, there is no consensus in the literature regarding the critical thinking skills of teachers and pre-service teachers. Based on the results of the study, recommendations were made for researchers and teacher training institutions.

Keywords: critical thinking, thinking skills, critical thinking skills, teacher qualifications, teacher's critical thinking skills

Öğretmen ve Öğretmen Adaylarının Eleştirel Düşünme Becerileri Konulu Araştırmaların Sistematik Derleme Yöntemiyle İncelenmesi

Özet

Bu çalışmada, öğretmen ve öğretmen adaylarının eleştirel düşünme becerileri üzerine yapılmış araştırmaların sistematik derleme yöntemiyle incelenmesi amaçlanmıştır. Çalışmada 2013-2022 yılları arasında Türkiye'de ve yurtdışında yayımlanmış 26 makale ve Türkiye'de yayınlanmış 4 yüksek lisans tezi incelemeye alınmıştır. Araştırmalar sistematik derleme yöntemine uygun olarak; yayın yılı, yayın türü, amaç, yöntem/desen, örneklem düzeyi, örneklem büyüklüğü, veri toplama araçları, veri analiz yöntemi, sonuç ve önerilerine göre temalandırılmıştır. Öğretmen ve öğretmen adaylarının eleştirel düşünme becerisi üzerine yapılan çalışmalarda pandemi öncesine kadar bir artış olduğu, pandemi ile araştırmalarda nispeten azalma olduğu görülmüştür. Araştırmalarda büyük oranda nicel desenin, veri toplama aracı olarak ise ölçek tipi veri toplama araçlarının tercih edildiği görülmüştür. Öğretmen ve öğretmen adaylarının eleştirel düşünme becerilerini ölçmek için en fazla kullanan ölçek Facione tarafından geliştirilen Kaliforniya Eleştirel Düşünme Eğilimleri Ölçeğidir. Araştırmaların amaçları bakımın benzer olduğu ancak sonuçlar bakımında farklılaştığı görülmektedir. Sonuç olarak alanyazında, öğretmenlerin ve öğretmen adaylarının eleştirel düşünme becerileri üzerine bir uzlaşı olmadığı söylenebilir. Araştırmanın sonuçlara göre araştırmacılara ve öğretmen yetiştiren kurumlara yönelik önerilerde bulunulmuştur.

Anahtar Kelimeler: eleştirel düşünme, düşünme becerileri, eleştirel düşünme becerileri, öğretmen nitelikleri, öğretmenlerin eleştirel düşünme becerileri

Introduction

Critical thinking skills are essential for conceptualizing, applying, analyzing, and evaluating knowledge obtained through observation, experience, intuition, reasoning, and other channels (Yılmaz, 2019). This cognitive ability encompasses various mental processes such as reasoning, questioning, understanding, learning, selecting, organizing, applying, inferring, decision making, criticism, and problem-solving (Güneş, 2021).

The concept of critical thinking (CT) has been interpreted in diverse ways throughout history, drawing perspectives from disciplines like psychology and philosophy. To explore this concept, a Delphi research project was undertaken by 46 American and Canadian researchers (Çatalbaş & Sarıtaş, 2022). Facione (1989) defines critical thinking as a purposeful, self-regulating

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judgment process involving interpretation, analysis, evaluation, inference, and explanation based on evidence, concepts, methods, criteria, or contextual considerations.

Studies on critical thinking skills (CTS) gained significant attention from the 1960s onward. Early researchers like Perry laid the foundation for further exploration of CTS. In Turkey, Kazancı (1989) and Cüceloğlu (1995) conducted initial studies on CTS, leading to a surge in research interest in the 21st century, making it one of the most extensively studied topics in educational and social sciences.

Education plays a pivotal role in human capital development (Muğan, 2018), creating a strong connection between education and economic progress. The changing production landscape necessitates a shift in the skills required for economic development, prompting governments and employers to seek graduates with higher levels of intelligence (Pithers & Soden, 2000). Consequently, the education system needs to equip individuals with the necessary competencies to meet the demands of different production styles.

The rise of "Industry 4.0" in 2010 sparked discussions on new production-consumption patterns and the skills needed for the future. Koca (2020) emphasizes the integration of cognitive, digital, social, and emotional skills for future human resource typologies, with critical thinking emerging as a key skill. The World Economic Forum, a leading authority, has identified critical thinking as the top skill for 2025 in its "Future of Jobs Report" (WEF, 2020), highlighting its growing importance across all disciplines.

Teaching critical thinking to students is quite challenging when it comes to being taught by their families or peers. That is why there is a need for knowledgeable, experienced, and continuously adaptable teachers who are committed to personal growth (Saka & Aşık, 2019). Just as qualified teachers are needed, the critical thinking skills of pre-service teachers, who are the teachers of the future, are also crucial. Furthermore, determining the level of critical thinking and empathetic tendencies among pre-service teachers is important in providing insights into how teacher education institutions can train more qualified teachers (Ekinci & Aybek, 2010). Therefore, in this study, research on the critical thinking skills of teachers and pre-service teachers is examined together, aiming to answer the following questions:

1. How is the distribution of studies conducted on CTS among teachers and pre-service teachers based on the years and publication types?
2. Is there a difference in CTS (Critical Thinking Skills) levels between teachers and pre-service teachers?
3. How are studies conducted on CTS among teachers and pre-service teachers distributed according to their objectives?
4. What research designs, data collection methods/tools, and data analysis methods have teachers and pre-service teachers frequently preferred in studies conducted on CTS?
5. Based on the findings and recommendations of studies conducted on CTS among teachers and pre-service teachers, which themes have they focused on?

Method

The aim of this study is to examine the systematic review method of the research conducted on EDC by teachers and pre-service teachers. Systematic review is a method of comprehensive scanning of all published studies in a field, using various inclusion and exclusion criteria, evaluating the quality of research, and determining which studies will be included in the review in order to answer a question or provide a solution to a problem. In the studies included in the review, the findings are synthesized (Karacam, 2013).

Data Collection

In this study, in order to benefit from current studies, articles and theses on teachers' and pre-service teachers' EDL between 2013-2022 covering 10 years were scanned in national and international databases. In this context, YÖK Thesis, DergiPark, Proquest, Web Science, Google Scholar, Science Direct, SAGE Journal and EBSCO databases were used. In the scans, “critical thinking skills of teachers” and “critical thinking skills of pre-service teachers” were used as keywords.

Data Analysis

The studies were analysed in accordance with the systematic review method. Systematic review is the screening of all studies in the field, determining the studies to be included in the review with inclusion-exclusion criteria and quality assessment, and synthesising the findings (Karaçam, 2013). In the study, both quantitative and qualitative studies were analysed according to the mixed method systematic review method. In the selection of the studies, the criteria of the studies being conducted within the last 10 years, being written in Turkish and English, and focusing on the critical thinking levels or tendencies of teachers and pre-service teachers were taken into consideration. The number of studies on critical thinking skills of teachers and pre-service teachers is quite high. For this reason, in this study, apart from the levels of critical thinking skills of teachers and pre-service teachers; attitude and interest studies related to critical thinking were excluded.

During the review, parameters were determined by considering the main lines of a scientific study and the questions of the study. In the process of determining these parameters, expert opinions were obtained from two academicians, one of whom was an expert in the relevant research method, and four teachers in total, three of whom were studying at master's and one doctoral level. The purpose and scope of the study were explained to the experts separately via online virtual meeting method. Within the scope of the study, the following parameters were stated to the experts; publication year, publication type, purpose, research design, sample level, sample size, data collection tools, sub-dimensions of the California Critical Thinking Disposition Scale, data analysis methods, results and recommendations. According to the experts' feedback, the parameters of the study were determined by excluding the sub-dimensions of the California Critical Thinking Disposition Scale. A total of 58 studies on the critical thinking skills of teachers and pre-service teachers were included in the analysis. 28 studies were excluded because they dealt with the interests and attitudes, not the critical thinking levels of teachers and pre-service teachers, and were largely not suitable for the parameters of the study. Categories and codes were created from 30 related studies in line with the determined parameters. After the creation of categories and codes, the opinions of experts were received and corrections, deletions and additions were made according to the suggestions of the experts.

Findings

The findings obtained in this study are presented below in order of the research problems. Accordingly, the distribution of the reviewed studies by year is presented first in the study.

Table 1. *Distribution of Articles and Theses on CTS Published by Years of Teachers*

Year	ƒ	%
2013	1	3.33
2015	3	10
2016	2	6.66
2017	3	10
2018	5	16.66
2019	5	16.66
2020	3	10
2021	4	13.33
2022	4	13.33
Total	30	100

Table 1 displays the frequency and percentage values of studies related to Critical Thinking Skills (CTS) by year, for both teachers and pre-service teachers.

Table 2. *Distribution of CTS Studies by Publication Type*

Publication Type	ƒ	%
Article	26	8.,66
Master Thesis	4	16.33
Total	30	100

Table 2 presents the distribution of the studies according to their publication type. Of the 30 studies examined in this research, 26 were articles, while four were master's theses.

Table 3. *Distribution of Studies on CTS for Teachers and Pre-service Teachers by Purpose*

Theme	Code	ƒ	%
Purpose	Investigation of CTS in terms of various variables	12	39.96
	Investigation of the effects of thinking programs on CTS	1	3.33
	Investigation of the relationship between CTS and other skills (problem-solving, creativity)	5	16.65
	Investigation of the relationship between CTS and attitudes, perceptions, and behaviors	6	19.98
	Investigation of the relationship between CTS and emotional intelligence	1	3.33
	Investigation of the impact of beliefs (educational, epistemological) on CTS	2	6.66
	Investigation of the relationship between learning styles and CTS	2	6.66
	Investigation of the relationship between CTS and ethical values	1	3.33
Total		30	100

Table 3 provides eight different codes based on the objectives of the studies. Of the studies that address CTS for teachers and pre-service teachers, 12 examine CTS from various variables, six examine the relationship between CTS and perception, attitude, and behavior, five examine the relationship between CTS and other skills, two examine the relationship between learning styles and CTS, two examine the impact of teachers' and pre-service teachers' educational and epistemological beliefs on CTS, one examines the effect of the CoRT (Cognitive Research Trust) thinking program on CTS, one examines the relationship between CTS and ethical values, and finally, one study aims to examine the relationship between CTS and emotional intelligence. As seen in Table three, studies aiming to examine CTS from various variables make up the largest percentage, accounting for 39.96% of the total studies.

Table 4. *Distribution of CTS Studies by Research Design*

Theme		Code	ƒ	%
Research Design	Quantitative	Survey	19	63.33
		Relational Survey	9	30
	Qualitative	Case Study	1	3.33
	Mixed	Not specified	1	3.33
Total			30	100

According to Table 4, out of the 30 studies examined, 28 were quantitative, one was qualitative, and one was mixed-methods. The most commonly used design in quantitative studies was the survey design (f = 19). The relational survey design was preferred in nine studies. Qualitative and mixed-methods studies accounted for only 6.66% of the examined studies.

Table 5. *Distribution of CTS Studies by Sample Level*

Theme	Category	Codes(ƒ)	ƒ	%
Sample Level	Teachers	Primary school Education(2) Biology(2) Preschool Education(1) Elementary and Secondary School Teachers(13)	10	33,33
	Pre-service teachers	Physical Education and Sports (1) Biology (1) Science (2) Primary school Education(6) Social Studies (2) Music (1) Elementary and Secondary School Teachers (7)	20	66.67
Total			30	100

Table 5 shows that the sample of the studies consisted of 20 studies with pre-service teachers and 10 studies with teachers. Twenty-one studies included samples of primary and secondary school teachers and pre-service teachers. Eight studies focused only on class teachers and pre-service teachers as their sample.

Table 6. *Critical Thinking Skill Levels of Teachers and Pre-service Teachers*

Theme	Codes	ƒ	%
Teachers	Low	3	33.33
	Moderate	3	33.33
	High	3	33.33
Pre-service teachers	Low	4	26.67
	Moderate	8	53.33
	High	3	20
Toplam		24*	

*The findings of the examined studies provide information about the levels of critical thinking skills of both teachers and pre-service teachers, as indicated in a total of 24 studies.

Table 6 presents an analysis of the levels of critical thinking skills among teachers and pre-service teachers. The distribution of critical thinking levels among teachers is observed to be balanced, with an equal representation of low, moderate, and high levels. Each category comprises three studies. However, the distribution of critical thinking skill levels among pre-service teachers shows a different pattern. Four studies indicate low levels of critical thinking skills, eight studies demonstrate moderate levels, and three studies identify high levels. In total, the 24 studies examined provide valuable insights into the critical thinking skill levels of both teachers and pre-service teachers. The results obtained from the table indicate a balanced distribution of critical thinking skill levels among teachers. Conversely, pre-service teachers exhibit a distinct trend in their critical thinking skill levels. The majority of pre-service teachers possess a moderate level of critical thinking skills, while the number of those with low and high levels is relatively smaller. In general, it can be concluded that both teachers and pre-service teachers tend to have moderate levels of critical thinking skills.

Table 7. *Distribution of CTS Studies by Sample Size*

Theme	Code	ƒ	%
Sample Size	0-100	6	20
	101-250	10	33.33
	251-500	8	26.66
	501-750	3	10
	751-1000	2	6.66
	1000+	1	3.33
Total		30	100

Table 7 presents the distribution of studies according to sample size. Of the total studies examined, 33.33% had a sample size in the range of 101-250, while 26.66% had a sample size in the range of 251-500. Therefore, it can be seen that more than half of the studies were within the sample size range of 101-500.

Table 8. *Distribution of CTS Studies by Data Collection Tools*

Theme	Category	Codes(ƒ)	ƒ	%
Data collection Tools	Scale	Scales of inclination (8) Skills scales (4) Attitude scales (4) Intelligence scales (1) Perception scales (1) Behavior scales (2) Belief scales (2) Motivation scales (1) Learning style scales (1) Professional ethical principles scales (1) Academic self-efficacy scales (1)	26	86.66
	Others	Semi-Structured Interviews(1) Participant Diaries(1) Researcher Diary(1) Observation Records(1)	4	13.33
Total			30	100

According to Table 8, 86.66% of the studies examined in this research used scale-type data collection tools, while 13.33% used other data collection tools. In total, data was collected using 11 different types of scales, and among these, Likert scales (f=8) were the most commonly used data collection tool.

Table 8. *Distribution of Frequency of Scales Used in Studies Related to CTS*

Theme	Code	ƒ	%
Scale	California Critical Thinking Disposition Inventory	16	33.33
	How Creative Are You Scale	2	4.16
	Problem Solving Inventory	1	2.08
	Critical Thinking Disposition Scale (EDE)	4	8.33
	Attitude Scale towards Book Reading Habits of Pre-service teachers	1	2.08
	Bar-On Emotional Quotient Inventory	1	2.08
	Organizational Power Distance Scale	1	2.08
	UF/EMI Critical Thinking Disposition Scale	2	4.16
	Teacher Autonomy Scale	1	2.08
	Organizational Dissent Scale	2	4.16
	Florida Critical Thinking Disposition Inventory	2	4.16
	Beliefs about Education Scale	1	2.08
	Epistemological Belief Scale	1	2.08
	Critical Thinking Skills Scale	1	2.08
	Achievement Oriented Motivation Scale	1	2.08
	Biodiversity Literacy Scale	1	2.08
	Kolb Learning Styles Inventory	2	4.16
	Attitude Scale towards Book Reading Habits	1	2.08
	Lateral Thinking Disposition Scale	1	2.08
	Lifelong Learning Orientation Scale	1	2.08
	Critical Thinking Attitude Scale	1	2.08
	Professional Ethics Principles Scale	1	2.08
	Academic Self-Efficacy Scale	1	2.08
	Democratic Attitude Scale	1	2.08
	Empathic Tendency Scale	1	2.08
Total		48*	100

*In some of the 30 studies, multiple scales were used, so the frequency is 48.

Table 9 presents the frequency of use of scales employed in the 30 studies examined in this research. Of the total 48 scales used, 16 were the California Critical Thinking Disposition Scale (CCTDS). This scale is used not to measure a skill, but to evaluate an individual's critical thinking disposition or, more broadly, their level of critical thinking. The scale has been adapted into Turkish by Kökdemir (Polat & Kontaş, 2018).

Table 9. *Distribution of CTS Studies by Data Analysis Methods*

Theme	Code	ƒ	%
Data Analysis Methods	t-tests	15	18.51
	ANOVA	16	19.75
	MANOVA	2	2.46
	Regression Analysis	9	11.11
	Correlation Analysis	17	20.98
	Content Analysis"	2	2.46
	Kruskal-Wallis H	7	8.64
	Mann Whitney U	7	8.64
	Road Analysis	1	1.23
	Descriptive Statistical Analysis	3	3.70
	Chi-square	2	2.46
Total		81*	100

*Since multiple data analysis methods were used in some of the 30 studies, the frequency is 81.

Table 10 provides the frequency and percentage distribution of data analysis methods used in the examined studies. It can be observed that parametric tests were mostly used for data analysis in the examined studies.

Table 11. *Distribution of Studies by Results*

Theme	Code	f	%
Results	Results by Demographic Variables	45	48.60
	Results by Various Variables	29	31.32
	Results by Teachers' and Pre-service teachers' Level of CTS	24	25.92
Total		108*	100

* The frequency value is 108 because multiple results were obtained in the studies.

Table 11 presents the research findings organized under three different themes. Accordingly, the results of the studies were categorized by demographic variables, various variables, and the CTS levels of teachers and pre-service teachers. Tables 12, 13, and 14 present the research results separately.

Table 12. *Results of Studies Related to CTS by Demographic Variables*

Theme	Ctegory	Codes(f)	f	%
Demographic Variables	Gender	Women Have Higher CTS (7) Men Have Higher CTS (2) Gender Has No Effect on CTS (11)	21	47.72
	Mother's Education Level	Mother's Education Level Has a Positive Effect on CTS (1) Mother's Education Level Has No Significant Effect on CTST (4)	5	11.36
	Father's Education Level	Father's Education Level Has a Positive Effect on CTS (1) Father's Education Level Has No Significant Effect on CTS (4)	5	11.36
	Age	As Age Increases, CTS Increases (2) Age Has No Effect on CTS (3)	5	11.36
	Seniority	As Seniority Increases, CTS Increases (3) Seniority Has No Effect on CTS (5)	8	18.18
Total			44*	100

* In some studies, multiple results were obtained based on demographic data, so 44 demographic results were obtained from the 30 studies examined.

The results of the studies examined in Table 12 are presented according to demographic variables. Demographic variables are considered in five categories: gender, mother's education status, father's education status, age, and seniority. According to the gender variable, women have higher CTS scores in seven studies, while men have higher scores in two studies. It was concluded that gender was not a predictor of CTS in 11 studies. In five studies examining the effect of mother and father's education status on CTS, it was found that their education status did not have an effect on CTS in four studies. Of the five studies examining the effect of seniority on CTS, three studies found that seniority was a predictor variable, while five studies concluded that seniority did not have an effect on CTS. Three out of five studies examining the age variable concluded that age did not have an effect on CTS, while two studies found a significant relationship between age and CTS.

Table 13. *Distribution of the Level of CTS of Teachers and Pre-service Teachers According to the Results Included in the Reviewed Studies*

Theme	Code	f	%
Level of Critical Thinking Skills	High	7	24.13
	Medium	8	27.58
	Low	8	27.58
	Not Specified	6	20.68
Total		29*	100

* Since 29 out of 30 studies included a scale on CTS, the frequency is 29.

Table 13 presents the results of studies conducted on the CTS level of teachers and pre-service teachers. It was found that 24.13% of teachers and pre-service teachers have a high CTS level, 27.58% have a moderate level, and 27.58% have a low level. It was observed that in 20.68% of the studies that measured CTS using a type of scale, the CTS level of teachers and pre-service teachers was not discussed.

Table 14. *Distribution of the Relationships of CTS with Various Variables According to the Results of the Reviewed Studies*

Theme	Category	Codes(f)	f	%
Relationships of CTS with Various Variables	Variables with a Significant Positive Relationship with CTS	Problem Solving Skill (1) Creative Thinking Skill (1) Autonomy Behavior (1) Organizational Dissent Behavior (1) Perception of Perennialism, Progressivism, and Existentialism Educational Philosophy (1) School Health Perception (1) Critical Analysis Skill (1) Biodiversity Literacy (1) Reading Habit (3) Lateral Thinking Skill (1) Lifelong Learning Skill (1) Empathy Skill (1) Perception of Professional Ethics Principles (1) Democratic Attitude (1) Academic Self-Efficacy Perception (1)	17	70.83
	Variables with a Significant Negative Relationship with CTS	Behavior of Conceding to Power (1) Perception of Essentialism Educational Philosophy (1)	2	8.33
	Variables with No Significant Relationship with CTS	Epistemological Beliefs (1) Learning Styles (2)	3	12.5
	Not Specified	CoRT5 Thinking Program (1) Having Received Education in Intelligence Games (1)	2	8.33
Total			24*	100

* Out of the 30 studies examined, 24 of them have examined the relationships of CTS with various variables.

In 24 of the examined studies, the relationship between CTS and various variables was addressed. According to Table 14, the relationship between CTS and various variables was divided into four different categories: variables that positively affect CTS (f = 17), variables that negatively affect CTS (f = 2), variables that do not have a significant relationship with CTS (f = 2), and variables that develop CTS (f = 2).

Table 15. *Distribution of Recommendations from the Studies*

Theme	Category	Codes(f)	f	%
Suggestion	Targeted towards Institutions Training Teachers	The Learning Process Should be Organized to Enhance CTS (12) Academics Should Create a Primary school Environment that Enhances CTS (6) Pre-service Teachers Should be Directed to Activities that Enhance CTS (5)	23	28.75
	Developers and Administrators of Education Policies	Teacher Training Programs Should be Developed (10) Participation in In-Service Training, Seminars, and Courses Should be Encouraged (4) Women's Education Level Should be Increased (1) Critical and Creative Thinking Courses Should be Added to the Curriculum (3) Positive School Climate Should be Established for Teachers (3)	21	26.25
	Targeted towards Researchers	Similar Studies Should be Conducted with Larger Sample Sizes (10) Different Assessment Tools Should be Used (4) Studies Should be Conducted in Different Designs (4) CTS Should be Investigated from Different Dimensions (14)	32	40
	Others	Artistic Activities Should be Increased in Small Settlements (2) Teachers Should Develop Reading Habits (1) Pre-service teachers Should Engage in Individual Sports Activities (1)	4	5
Total			80*	100

* Due to multiple recommendations in the studies, the frequency value is 80.

According to Table 15, 80 recommendations were reached from the 30 examined studies. These were divided into four different categories: Recommendations for Teacher Training Institutions (f = 23), Recommendations for Education Policy Developers and Managers (f = 21), Recommendations for Researchers (f = 32), and Other Recommendations (f = 4).

Results and Discussions

In this study, an analysis of research on the critical thinking skills of teachers and pre-service teachers was conducted, covering a total of 30 articles and theses published between 2013 and 2022. Despite the abundance of research on CTS and other thinking skills in the literature, this study was limited to the analysis of studies on CTS for teachers and pre-service teachers, with a focus on the most recent research available. The selected studies were examined and classified according to year of publication, type of publication, research objectives, sample size and level, research design, data collection tools, data analysis methods, findings, and recommendations.

The studies examined in this analysis were deliberately selected from the past 10 years to ensure their relevance and currency. Of the 30 studies reviewed, 21 were published within the past five years, with one study included from 2013 and none from 2014. The years 2018 and 2019 had the highest frequency of publications, with five studies each. Sarıkoç and Kıncal (2022), Virlan (2021), and Kuru and Şimşek (2022) have noted that 2019 was the year with the highest frequency of studies on CTS, and that research in this area has been increasing in recent years. Therefore, it can be stated that there has been an increase in research on CTS for teachers and pre-service teachers in recent years. The decline in the frequency of studies after 2019 can be attributed to the negative impact of the global pandemic on scientific research processes. It is expected that a regular increase in research on CTS can be observed once the pandemic subsides and schools and teacher training institutions return to full-time education.

The analysis of the examined studies reveals that pre-service teachers and teachers demonstrate a moderate level of critical thinking skill. These findings suggest that there is no significant difference in the level of critical thinking skills between pre-service teachers and teachers. Both groups exhibit a similar level of competence in critical thinking. These results indicate that pre-service teachers, during their training process, develop critical thinking skills at a comparable level to that of experienced teachers. This finding is valuable as it highlights the preparedness of pre-service teachers to enter the teaching profession and effectively impart critical thinking skills to students.

When considering the type of publications, it can be observed that studies in the form of articles with 26 frequency values are significantly more common than studies at the level of master's theses with only four frequency values. This result does not parallel with Kestel's (2022) findings but is consistent with the findings of Kuru and Şimşek (2022).

Regarding the purposes of the examined studies, it is seen that investigating the relationships between CTS and different variables (f=12) stands out as the prominent aim. Researchers have investigated CTS in terms of various variables such as skills, attitudes, behaviors, types of intelligence, learning styles, and beliefs. Özcan and Batur (2020) noted that studies on the impact of different variables on CTS represent the second-highest topic area with a frequency of 31.8%. The findings of Çakan and Kabataş (2021) also indicate that investigating the

relationship between CTS and various variables is one of the prominent aims. Therefore, the high frequency of studying the relationship between CTS and various variables may stem from the fact that CTS is related to every aspect of life. The wide range of relationships that CTS possesses may also facilitate the design of research problems related to CTS.

In terms of the sample level, it is observed that 20 studies focused on pre-service teachers while 10 studies focused on in-service teachers. Akkaş and Memiş (2021) indicated that undergraduate students form the largest group in studies on CTS in terms of the sample level. Choosing pre-service teachers as the sample level may be explained by the ease of access to pre-service teachers. Researchers may also think that the data collection process will take less time when working with pre-service teachers.

When examining the studies according to the sample size, it can be seen that the frequency value of studies with a sample size ranging from 101 to 250 is 10, while there is only one study with a sample size of 1000 or more. The sample size of the studies is mainly composed of large groups. This result is parallel with Virlan's (2021) findings. The use of quantitative designs and the use of scale-type data collection tools may make it easier to reach large sample sizes in the studies.

The results show that 93.33% of research studies are designed using quantitative research designs. This finding is consistent with the findings of Akkaş and Memiş (2021), Kuru and Şimşek (2022), Virlan (2021), and Sarıkoç and Kıncal (2022). Among quantitative research designs, the most commonly used design is the survey research design (f=19). The survey research design is a research method that allows the description of trends, attitudes, or opinions across the population by conducting research on a sample selected from the population. The researcher draws inferences about the population based on the data collected from the sample (Creswell, 2017). The predominance of survey research designs can be explained by the prevalence of scales suitable for this design and the ease of designing studies on CTS using this design.

The results also show that 86.66% of studies used scales as the data collection tool, and out of the 48 scales used, 33.33% of them were the California Critical Thinking Disposition Scale. This finding is consistent with the findings of Akbaş and Memiş, Kuru and Şimşek (2022). The ease of data collection and the availability of many scales developed for CTS may have influenced the choice of scales as a data collection tool. The pioneering work of Facione and colleagues in this area and the international high reliability of the scale may have facilitated the preference for the California Critical Thinking Disposition Scale.

When research studies are analyzed according to data analysis methods, it is found that correlation analysis was the most frequently used method with 17, followed by ANOVA with 16 and t-tests with 15 frequencies. This finding is consistent with the findings of Akbaş and Memiş (2021). The predominance of quantitative research designs and the use of scales as the data collection tool may have led researchers to use quantitative analysis methods.

According to the results of the studies examined, they have been divided into three themes. The first theme has focused on the results of the studies according to demographic variables. The demographic variables that frequently emerge in the studies are gender, age, parental education, and seniority level. While seven studies have shown that women have higher

critical thinking skills (Arslan, 2022; Bakır et al., 2019; Can & Kaymakçı, 2015; Koçak et al., 2015; Özgün, 2019; Vural, 2018; Yıldız & Yılmaz, 2020), two studies have shown that men have higher critical thinking skills (Açışlı, 2016; Durnacı & Ültay, 2020). However, there are ten studies that have shown that gender does not have an effect on critical thinking skills (Aşık & Saka, 2019; Avaroğulları & Şaman, 2020; Baydar, 2021; Bulut & Yoldaş, 2022; Erdem & Yazcıoğlu, 2015; Erdem et al., 2013; Gökkuş & Delican, 2016; Kilic et al., 2017; Oben Şahin & Sevgi, 2021; Öden, 2021; Polat & Kontaş, 2018). Therefore, it can be concluded that there is no significant relationship between gender and critical thinking skills when all of the studies' results are considered together. However, it should be noted that in a significant portion of the studies, women have shown better results. According to the findings of Akbaş and Memiş (2021), there are 39 studies that conclude that there is a relationship between gender and CTS, and 34 studies that conclude that there is no relationship. Çolak et al. (2022) have stated that the gender variable has a low level of influence on critical thinking tendency. Therefore, it can be said that there is no consensus in the literature regarding the relationship between critical thinking skills and gender among teachers and pre-service teachers. Studies examining the relationship between age and critical thinking skills among pre-service teachers and the relationship between age, seniority, and critical thinking skills among teachers have also shown no significant relationship between these variables and CTS. Five studies that examined parental education and critical thinking have concluded that there is no relationship between critical thinking and parental education. In conclusion, it can be said that demographic variables such as age, gender, parental education, and seniority do not have a significant effect on the critical thinking skills of teachers and pre-service teachers.

No significant results were found in the studies on the CTS levels of teachers and prospective teachers. Akbaş. and Memiş (2021, p. state that the CTS levels of teachers and pre-service teachers are at medium level, Kuru and Şimşek (2022) at high level. According to Sarıkoç and Kıncal (2022), CTS of teachers is at low level. Accordingly, it can be said that there is no consensus in the studies on the CTS levels of teachers and prospective teachers. It can be thought that the use of different measurement tools has an effect on the differentiation of the results. In addition, due to the changes made in the student selection and placement system in teacher training institutions, the inclusion of students at different levels in undergraduate education in different years may also explain this differentiation.

A total of 80 recommendations were identified in the examined studies. Of these recommendations, 32 were directed towards researchers, 23 towards teacher training institutions, 21 towards education policy developers and administrators, and four were categorized as other recommendations. The highest frequency value was reached by the recommendation to investigate critical thinking skills from various dimensions, with a frequency of 14. Given the potential relationship between critical thinking skills and many different variables, it is plausible that researchers emphasized this recommendation.

Based on the results obtained from the examined studies, the following recommendations are made for researchers, teacher training institutions, and education policy developers and administrators:

Recommendations for Researchers:

• Studies on CTS conducted with teachers and pre-service teachers are largely organized in the form of scanning and relational scanning designs. Therefore, studies conducted in different research designs could enrich the literature.

• Research could be conducted on the critical thinking skills of academics in teacher training institutions.

• An experimental study could be conducted on the development of CTS in teachers and pre-service teachers.

• An examination could be conducted on the consistency of scales that measure CTS.

Recommendations for Institutions that Train Teachers:

• Academics should be open to all ideas. They should create learning environments that encourage pre-service teachers to express their ideas and develop different ideas.

• Elective courses that will develop CTS should be included in teacher training undergraduate programs.

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