



Research Article

A thematic content analysis study on concept map oriented graduate theses between 2001 and 2023

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Abstract

The main purpose of this study is to examine the postgraduate theses on concept mapping in terms of purpose and method and to determine the general trends of the studies prepared within the framework of this theme. The data obtained for this purpose were analyzed by thematic content analysis method. The postgraduate theses published on the official website of the National Thesis Center of the Higher Education Institution in Turkey (YÖK TEZ) between 2001 and 2023 on concept mapping were scanned in line with the criteria for inclusion in the study. A total of 116 graduate thesis, 100 master's theses (MT) and 16 doctoral theses (DT), were included in the study. The inclusion criteria were "being within the specified date range", "being concept map-oriented", "being within the Institute of Educational Sciences and Social Sciences". The distribution of the theses within the scope of the research was examined according to the year of publication, type of publication, subject, method/pattern, sample/study group and size, type of data collection tools, data analysis methods and the department/science branch. According to the results of the research, it was determined that the theses examined were mostly aimed at examining the effect of concept maps on student achievement, were predominantly designed in experimental design, the sample/study group was mostly in the range of 51-100 participants, and the sample consisted mostly of primary and secondary school students. It is thought that the main results of this study will provide important clues to researchers working in this field. Within the framework of the results of the research, it can be suggested that different research methods should be utilized in new studies to be conducted in this subject area, especially qualitative studies should be designed to examine the subject.

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Introduction

Scientific and technological developments brought about by our age lead countries to a process of change and transformation in education, social and economic fields. The type of people needed by countries is changing. Qualified individuals who can think critically and analytically, offer creative solutions to the problems brought about by social changes and have high-level thinking skills constitute the type of people that countries need. Raising individuals who can adapt to innovations, access the right information from the rapidly spreading mass of information, and distinguish the right information from the wrong information by approaching information critically is among the educational goals of developed countries. For this reason, countries take these qualifications into consideration when determining their

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educational goals. Education has an important role in raising the type of people that countries need. The places where education and training activities are provided in a planned and programmed manner are schools, which are formal education institutions.

The quality of teaching activities in schools is possible by selecting the right teaching strategies, methods, techniques and approaches to be used according to student needs. In this respect, Ausubel (1968) developed the meaningful learning strategy, which is one of the most important points in education and training and an element that affects learning. According to the meaningful learning strategy, the most important factor affecting learning is the knowledge that the learner has in his/her cognitive structure (Novak & Musonda, 1991). Sönmez (2015) stated that student needs should be taken into account in education and training activities and that information will be learned in a meaningful way by choosing appropriate teaching strategies, methods, techniques and approaches according to these needs. In this context, in order to raise individuals who learn information in a meaningful way, it is important to know how individuals learn and what kind of learning approach they have for the act of learning (Önder & Beşoluk, 2010).

Learning has been a concept that has been studied by many researchers from past to present. In these studies, how learning is realized with which strategies, methods, techniques and approaches, and how meaningful and permanent learning is realized have been among the questions that are frequently sought for answers in the field of education (Özgür & Tosun, 2012). In this context, many approaches explaining learning have been proposed by different researchers to answer these questions. Among these approaches, the prominent ones are the approaches put forward within the framework of behaviorist learning and cognitive learning theories. The meaningful learning strategy proposed by Ausubel draws attention as one of the cognitive learning theories.

The meaningful learning approach is based on learning the information presented to the individual verbally through reception and in a meaningful way. In order for meaningful learning to occur in this sense, firstly, a meaningful learning material that will be meaningful to the students is presented and the learner is expected to associate this meaningful learning material with his/her previous learning. According to this strategy, when these two conditions are met, the learner will be able to create a new meaning in his/her mind about the learning material (Ausubel, 1962).

Novak, Govin and Johansen (1983) state that the key factor in the successful realization of meaningful learning is the prior knowledge/concepts of the individual. They also state that meaningful learning will occur when the new information is consciously connected with the related concepts that already exist in the individual's mind, otherwise the individual will arbitrarily incorporate the new information into the cognitive structure and as a result, rote learning will occur. At this point, it is important to know that unless the information learned by rote learning is repeated, it will be forgotten from long-term memory, misconceptions will be formed in the learner, and there will be no possibility of using the learned information in subsequent learning (Novak & Canas, 2006). Ausubel (1962) states that the meaningful learning approach through reception can be used effectively in learning concepts representing objects and events. In this context, learning starts with concepts (Sönmez, 2015).

Concept Map in Learning-Teaching Processes

Novak developed the concept map method in 1972 in his research in which he aimed to follow the changes in children's knowledge of science and to reveal children's ability to acquire scientific concepts based on Ausubel's theory of meaningful learning (Novak & Canas, 2006).

A concept map is a research, assessment and teaching tool to facilitate meaningful learning in which the most inclusive and general concepts at the top of the map are hierarchically arranged, and more specific concepts are hierarchically organized downwards (Novak, Govin, & Johansen, 1983). Concept maps are visual images of concepts in students' minds (Erdimez, Tan, & Zimmerman, 2017). Freeman and Jessup (2004) defined concept mapping as a technique that allows one person to convey the meaning and relationships between concepts to another person in a visual format. Concept mapping is a learning strategy developed as a research tool to represent students' prior knowledge and then as a tool to enhance meaningful learning (Heinze-Fry & Novak, 1990). Kinchin (2000) emphasizes that a concept map is a highly flexible tool that can be adapted for use by almost any group of students. Concept maps help students internalize important concepts and integrate these concepts with prior knowledge while exploring students'

knowledge levels and misconceptions. It is also known that all knowledge domains can be represented by concept maps and that there is no knowledge or skill domain for which concept maps cannot be used as a representational tool (Novak, 1990).

Considering the definitions provided regarding concept maps, it can be said that concept maps are graphical tools illustrating concepts and the relationships among these concepts, serving as learning tools for students to express what they have learned. Concept maps, which allow information presented to students in graphical ways, facilitate meaningful learning by representing relationships between concepts in the minds of teachers and students, thereby assisting in teaching and learning processes (Santhanam, Leach, & Dawson, 1998).

Novak, Govin, and Johansen (1983) state that concept maps have positive effects on creative thinking skills within higher-order thinking abilities, aiding students in meaningful learning and helping them construct a conceptual understanding of the subject to be taught. Although concept maps require higher-order thinking skills, they are a practical tool that can be used at various educational levels to certain extents. Rice (2000) indicates that the use of concept maps is not limited to any specific group of students. Studies conducted with primary school children demonstrate that even first-grade students can be successful in concept mapping (Novak, Govin, & Johansen, 1983). Gödek, Polat, and Kaya (2018) express that qualified teaching is possible through meaningful learning at the level of concepts, emphasizing that the success of concept teaching lies in using concepts correctly and appropriately, avoiding confusion with other concepts, and establishing accurate relationships between concepts. One of the most effective tools that can be utilized in achieving this outcome is concept maps within teaching practices.

The use of concept maps as a teaching or assessment tool in the field of education spans a long period, thereby covering a broad timeframe in the studies conducted in this field. Within the scope of this research, an examination was carried out on postgraduate thesis studies related to concept maps in Turkey (from 2001 to 2023) in terms of their subject matter and methodological context. The aim was to present an overview from the past to the present, through a content analysis, and contribute to the literature based on the results obtained. Furthermore, no research specifically addressing this area was found in the existing literature, which underscores the significance of the outcomes of this study in contributing to future research in this field. Pursuant to the stated primary objective, the research sought answers to the following questions:

Concept map-focused postgraduate theses in the field of education:

- What is the distribution according to the department/branch of science?
- How is the distribution based on the year of publication?
- What is the distribution according to the type of publication?
- How is the distribution concerning their subjects/topics?
- What is the distribution based on the methodology/design?
- How is the distribution concerning the sampling/participant group?
- What is the distribution based on the size of the sampling/participant group?
- How is the distribution according to the type of data collection tools?
- What is the distribution concerning the data analysis methods?"

Method

Research Design

In this research, the method of thematic content analysis, one of the types of content analysis, has been utilized. This analysis method involves synthesizing and interpreting, critically and as a whole, the trends, findings, and outcomes of studies conducted in a similar field, considering established themes and templates (Finfgeld, 2003). Thematic content analysis allows for the synthesis of common aspects of studies addressing similar topics within a qualitative understanding. In this respect, thematic content analysis is regarded as a rich reference source, enabling researchers who cannot access all studies in their field to reach more extensive research (Çalık, Ayaş, & Ebenezer, 2005; Çalık & Sözbilir, 2014). Due to the in-depth examination in thematic content analysis, a limited number of studies are subjected to

analysis. Hence, in this study, between 2001 and 2023, an in-depth examination of postgraduate theses related to concept maps conducted within domestic education and social sciences institutes was carried out to reveal current trends in the field, thus justifying the preference for thematic content analysis.

Data Collection

Prior to obtaining the data, inclusion criteria and keywords for the research were determined. Subsequently, a search was conducted on the Higher Education Council National Thesis Center (YÖK TEZ) official website using the keyword 'concept map.' A total of 187 postgraduate theses, comprising 29 doctoral theses (DT) and 158 master's theses (MT) related to concept maps between 2001 and 2023, were retrieved through the search engine. The retrieved theses were re-examined in accordance with the inclusion criteria for the research. In determining the theses to be included in the study, the criteria utilized focused on concept map orientation within the framework of the Institute of Education and Social Sciences between 2001 and 2023. According to these criteria, among the included postgraduate theses, 86 were from the Institute of Educational Sciences, 48 from the Institute of Natural Sciences, 43 from the Institute of Social Sciences, six from the Institute of Health Sciences, three from the Graduate School of Education, and one from the Institute of Engineering and Natural Sciences.

In the subsequent stage, a total of 10 theses, consisting of three DT and seven MT from the Institute of Social Sciences, did not fully meet the defined criteria and were therefore excluded from the scope of the study. Additionally, two MT conducted at the Institute of Educational Sciences were excluded from the research as they focused on meta-analysis topics. Consequently, the analysis process continued with a total of 116 postgraduate theses, comprising 100 MT and 16 DT.

Data Analysis

The theses to be subjected to thematic analysis were examined under the titles of 'publication year, level, topic, method/design, sampling/participant group and size, type of data collection tools, data analysis methods, department/branch of science,' and the data were transferred to Excel. The theses included in the study were coded as Doctoral Thesis 1: DT1 and Master's Thesis 1: MT1. To prevent incorrect data entry and any potential data loss, following the entry of research question answers into the Excel table, the researcher and an expert simultaneously compared the data. Following the coding process conducted on the data, themes and sub-themes were identified, and relevant tables were created.

Validity and Reliability

Verification processes regarding the analysis phase and raw data were conducted by both the researcher and an expert, ensuring the reliability of the analysis through result comparisons. In cases where inconsistencies were observed between the researcher's and the expert's opinions, a re-examination was performed to achieve consensus. To ensure the external reliability of the study, all procedural steps were extensively presented in tables in the methodology section. Additionally, data verification processes were recorded both digitally and in print.

Results

In this section of the study, thematic analysis results conducted on the theses included in the research are sequentially presented.

Table 1 provides distribution information of postgraduate theses focused on concept maps according to the publication year.

Table 1. Distribution of postgraduate theses focused on concept maps by publication year

Publication Year Range	Publication Level	f	%
2019-2023	MT	17	80.95
	DT	4	19.05
	Total	21	100.0
2013-2018	MT	19	76.00
	DT	6	24.00
	Total	25	100.0
2007-2012	MT	32	94.12
	DT	2	5.88
	Total	34	100.0
2001-2006	MT	32	88.89
	DT	4	11.11
	Total	36	100.0

As seen in Table 1, the distribution of postgraduate theses examined in this study according to their publication years reveals that the majority of concept map-focused theses (%31.03) were conducted between 2001 and 2006. Among these theses, the majority (%86.21) were master's theses. The distribution in the table also indicates fluctuations in the increase and decrease trends of domestically conducted theses related to concept maps from 2001 to the present. However, it can be stated that the continuity of the subject remains within the scope of researchers' interest. Table 2 illustrates the distribution of theses examined in the study according to their level.

Table 2. Distribution of postgraduate theses focused on concept maps according to their level.

Publication Level	f	%
MT	100	86.21
DT	16	13.79
Total	116	100.00

As seen in Table 2, the distribution of postgraduate theses focused on concept maps examined in this study shows a predominance of MT (%86.21) in this subject area. However, it can be observed that the proportion of DT related to concept maps is not insignificant (%13.79).

Table 3 illustrates the distribution of theses examined in the study according to their topics.

Table 3. Distribution of postgraduate theses focused on concept maps according to their topics

Topic	Thesis Code	f	%
The impact of concept mapping on success (academic achievement, learning the unit/topic, comprehension, learning and academic success, cognitive processes, attainment...)	MT2, MT3, MT4, MT9, MT11, MT12, MT16, MT17, MT19, MT20, MT21, MT23, MT24, MT28, MT30, MT31, MT33, MT34, MT35, MT37, MT40, MT41, MT46, MT48, MT53, MT55, MT58, MT59, MT61, MT62, MT63, MT64, MT67, MT69, MT70, MT71, MT72, MT73, MT74, MT75, MT77, MT78, MT79, MT82, MT84, MT85, MT86, MT88, MT90, MT91, MT93, MT97, MT98, MT99, MT100, DT1, DT2, DT4, DT5, DT6, DT8, DT12, DT13, DT14, DT16	65	38.24
The impact of concept mapping on attitude (towards the course, unit, topic...)	MT9, MT11, MT16, MT28, MT30, MT31, MT34, MT36, MT37, MT40, MT41, MT42, MT46, MT48, MT55, MT56, MT61, MT62, MT63, MT71, MT73, MT76, MT83, MT87, MT94, MT98, DT3, DT5, DT11, DT12, DT14	31	18.24
The impact of concept mapping on the retention of learning (recall of the subject matter, remembering information...)	MT12, MT16, MT23, MT24, MT28, MT31, MT46, MT53, MT55, MT56, MT62, MT63, MT73, MT94, MT99, MT100, DT1, DT5, DT8, DT13, DT16	21	12.35
Concept mapping as an assessment and evaluation tool	MT38, MT45, MT47, MT49, MT52, MT54, MT57, MT60, MT65, MT66, MT67, MT96, DT15	13	7.65
The effect of concept mapping on concept learning (concept development, acquisition, knowledge structures...)	MT14, MT26, MT43, MT50, MT51, MT78, MT97, MT98, DT16	9	5.29
Creating concept maps (Teacher/student knowledge and usage skills in concept mapping, development/creation of concept maps...)	MT7, MT13, MT15, MT 27, MT83, MT92, DT7	7	4.12
The impact of concept maps on fundamental skills (writing, speaking, reading comprehension...)	MT8, MT10, DT3, DT9, DT11	5	2.94
Perceptions regarding the appropriateness of concept map usage (teacher/student perspectives)	MT15, MT22, MT25, DT7	4	2.35
Representation of topics through concept mapping (lessons, programs, texts...)	MT18, MT32, MT81	3	1.76
The influence of concept maps on motivation (impact on motivation towards a course...)	MT76, DT4	2	1.18
The effect of concept maps on anxiety (related to a course, public speaking...)	MT9, MT10	2	1.18
The impact of concept maps on strategy usage	DT14	1	0.59
The effect of concept maps on thinking abilities (geometric thinking...)	MT80	1	0.59
The impact of concept maps on problem-solving skills	MT95	1	0.59
The influence of concept maps on metacognitive skill development	MT1	1	0.59
The effect of concept maps on prediction levels (predicting report card grades and adjusted Student Selection and Placement Test scores...)	MT39	1	0.59
The impact of concept maps on association skills	MT	1	0.59
The effect of concept maps on self-efficacy (course-related self-efficacy)	MT9	1	0.59
The influence of concept maps on mathematical proficiency	MT29	1	0.59

Table 4. Distribution of postgraduate theses focused on concept maps according to the utilized methodology.

Method	Type	Thesis code	f	%	
Quantitative	Experimental	Pretest-posttest nonequivalent control group quasi-experimental design	MT2, MT3, MT4, MT9, MT10, MT11, MT12, MT14, MT16, MT17, MT20, MT21, MT24, MT28, MT29, MT30, MT33, MT34, MT35, MT36, MT37, MT38, MT41, MT42, MT46, MT48, MT49, MT53, MT55, MT56, MT58, MT59, MT61, MT62, MT63, MT64, MT67, MT70, MT71, MT72, MT73, MT74, MT75, MT76, MT77, MT78, MT79, MT80, MT82, MT84, MT85, MT86, MT87, MT90, MT91, MT94, MT95, MT97, MT98, MT99, MT100, DT5, DT6, DT10, DT12, DT13, DT14, DT16	68	58.62
		Pretest-posttest nonequivalent control group quasi-experimental design	MT19, DT1	2	1.72
		Comparative single-subject multiple-baseline design across behaviors	MT23, MT43	2	1.72
		Pretest-posttest experimental group quasi-experimental design	MT31	1	0.86
	Scanning	Posttest control group experimental design	MT66, MT69	2	1.72
		Descriptive survey	MT25, MT39, MT45, MT50, MT65, MT83, MT89, MT92, MT93, DT15	10	8.62
		Correlational survey	MT22, MT27, MT51, MT52, MT54 MT96,	6	5.17
Qualitative	Action Research	MT5, MT15, DT9	3	2.59	
	Case Study	MT6, MT13, MT44	3	2.59	
	Interview	MT47, MT60	2	1.72	
	Descriptive	MT18, MT26	2	1.72	
	Documentation	MT32, MT68, MT81	3	2.59	
Mixed	Embedded Design	DT2, DT4	2	1.72	
	Convergent Parallel Design	MT7	1	0.86	
	Sequential Explanatory Design	MT8, DT3	2	1.72	
	Simultaneous Variation	DT7, DT8	2	1.72	
	Other (Mixed but design not specified)	MT1, MT40, MT57, MT88, DT11	5	4.31	

Table 5. Distribution of postgraduate theses on concept mapping according to the sample/participant group

Sample/Participant Group	Grade Level	Thesis Code	f	%
<i>Primary and Secondary Education</i>	4 th grade	MT26, MT43, MT72, MT92, MT94	5	4.00
	5 th grade	MT16, MT22, MT57, MT60, MT64, MT72, MT88, MT100, DT14	9	7.20
	6 th grade	MT19, MT22, MT23, MT31, MT33, MT36, MT46, MT53, MT54 MT58, MT61, MT62, MT73, MT75, MT76, MT79, MT92, MT97	18	14.40
	7 th grade	MT1, MT2, MT10, MT11, MT22, MT25, MT40, MT63 MT71, MT80, MT83, MT86, MT87, MT98, MT99, DT5, DT10, DT13	18	14.40
	8 th grade	MT9, MT22, MT26, MT28, MT29, MT30, MT35, MT38 MT39, MT42, MT56, MT78, MT90, MT95, DT4, DT11	16	12.80
	9 th grade	MT22, MT34, MT49, MT50, MT67, MT69, MT70, MT82, MT84 MT85, MT91, MT93, MT96	13	10.40
	10 th grade	MT21, MT22, MT48, MT50, MT59, MT77, DT1, DT12, DT16	9	7.20
	11 th grade	MT17, MT22, MT50, MT74	4	3.20
	12 th grade	MT12, MT22, MT26, MT41, MT50, MT65	6	4.80
	Total			98
University Students		MT3, MT4, MT5, MT6, MT8, MT14, MT20, MT37, MT44, MT51, MT52, MT66, MT89, DT2, DT3, DT6, DT7, DT8, DT9.	19	15.20
Teachers		MT7, MT13, MT15, MT22, MT25, MT27, MT45, MT47	8	6.40
Total			27	21.60

Note: In cases where studies involve multiple levels of participant groups, coding has been applied to the relevant levels. Additionally, the theses focusing on theoretical aspects of concept mapping are not included in this table

When examining Table 3, it is observed that the theses predominantly focus on investigating the influence of concept maps on student achievement (38.24%). These studies generally aim to determine the effectiveness of concept maps in aiding students' understanding and learning of the discussed subject matter, their success in the subject, and attainment. Table 4 presents the distribution of theses examined in the study based on the preferred methodology.

According to Table 4, it is evident that among the postgraduate theses focused on concept mapping included in the study, various methods such as quantitative, qualitative, and mixed methods were utilized. However, it was determined that the theses were predominantly designed with quantitative research methods, particularly the experimental method (64.66%). Table 5 displays the distribution of theses examined in the study based on the sample/participant group.

When Table 5 is examined overall, it is observed that among the concept mapping-focused theses studied between 2001 and 2023, the sample/participant groups primarily consisted of primary and secondary education students (78.40%). This was followed by university students (15.20%). This finding indicates that concept mapping studies are predominantly conducted with student groups in primary and secondary education levels, yet studies involving teachers and teacher candidates are also present. Furthermore, an analysis was conducted regarding the sample/participant group sizes of the examined theses and the data were tabulated.

Table 6 demonstrates the distribution of postgraduate theses focused on concept mapping according to the sample/study group sizes.

Table 6. Distribution of postgraduate theses focused on concept mapping by sample/study group size

Sample/Participant Group Size	Thesis Code	f	%
1-10 participant	MT23, MT43	2	1.77
11-30 participant	MT5, MT13, MT14, MT15, MT31, MT38, MT47, MT54 MT62, MT93 MT96, DT7, DT9	13	11.50
31-50 participant	MT1, MT2, MT6, MT8, MT10, MT12, MT19, MT21, MT24, MT33, MT35 MT40, MT41, MT44, MT53, MT56, MT63, MT66 MT70, MT74, MT75 MT84, MT90, MT95, DT2, DT3	26	23.01
51-100 participant	MT3, MT9, MT11, MT16, MT20, MT25, MT28, MT29, MT30, MT34 MT36, MT42, MT45, MT48 MT49, MT58, MT59, MT60, MT61, MT64 MT67, MT71 MT73, MT77, MT78, MT79, MT82, MT83, MT85, MT86 MT88, MT89, MT91, MT94, MT97, MT100, DT1, DT4, DT5, DT6, DT8, DT10, DT12, DT13	44	38.94
101-150 participant	MT17, MT37, MT39, MT46, MT52, MT57, MT65, MT69, MT72, MT80 MT87, MT98, DT11, DT14, DT16	15	13.27
151-200 participant	MT4, MT7, MT26, MT92, MT99	5	4.42
201-400 participant	MT50, MT51, MT76, DT15	4	3.54
401-500 participant	MT27	1	0.88
700-850 participant	MT22	1	0.88
Toplam		113	100

Note: Additionally, the theses that theoretically approach the concept map are not included in this table.

When Table 6 was examined, it was revealed that among the theses related to concept maps, the most prevalent sample/participant group size falls within the range of 51-100 participants (38.94%), whereas the smallest sample/participant group size (0.88%) falls within the range of 401-700 participants. Table 7 presents the results of the examination based on the data collection tools used in the theses.

Table 7. Distribution of data collection tools in postgraduate theses focused on concept mapping

Assessment Tools	Thesis Code	f	%	
Scale	Attitude Scale MT9 MT16, DT1, DT3, DT7 MT28 MT30 MT31, MT34, MT36, DT11, MT37, MT40, MT41, MT42, MT46, MT48, DT12, DT5, MT55, MT56, MT61, MT62, MT63, MT71, MT73, MT76, DT13, MT77, MT79, MT83, DT14, MT87, MT94, MT98	35	18.32	
	Metacognitive Awareness Scale	MT1	1 0.52	
	Transcognitive Skills Scale	MT1	1 0.52	
	Anxiety Scale	MT9, MT10	2 1.05	
	Self-Efficacy Perception Scale	MT9	1 0.52	
	Opinion Scale	DT5	1 0.52	
	Attrition Scale	DT6	1 0.52	
	Power Scale	MT29	1 0.52	
	Motivation Scale	MT76	1 0.52	
	Learning Style/Strategy Scale	MT83, DT14	2 1.05	
Survey	DT4, MT7 MT25 MT27 DT8, MT33, DT11, MT38, MT46, MT50, MT69, MT70, DT13, MT88	14	7.33	
Test	Achievement Test MT1, DT3, DT2, DT4, MT2, MT3, MT4, MT9, MT11 MT16, MT12, MT14, MT17, MT20 MT19 MT21 MT24, DT5, DT6 DT7 MT28 DT8, DT9 MT30 DT10, MT33, MT34, MT35, MT36, DT11, MT37, MT38, MT39, MT41, MT42, MT46, MT48, MT49, MT51, MT52, MT53, DT12, MT54, MT55, MT56, MT57, MT58, MT59, MT61, MT62, MT63, MT64, MT65, MT66, MT67, MT70, MT71, MT72, MT73, MT74, MT75, DT13, MT77, MT78, MT79, MT80, MT82, MT84, DT14, MT85, MT86, MT87, MT88, MT90, MT91, MT92, MT93, MT94, MT95, DT15, MT97, MT98, DT16, MT99, MT100	85	44.50	
Interview	Semi-Structured Interview Form	DT1 DT2 DT3 MT8 MT10 MT13 MT15 MT24 MT29, MT36, DT11, MT40, MT44, MT47, MT53, MT60, MT64, MT73, DT13, MT87, Y88	21	10.99
	Unstructured Interview Form	MT5, MT6	2 1.05	
	Pre/Post Interview Form	MT5, MT13	2 1.05	
	Focus Group Interview Form	DT2	1 0.52	
Observation	-	DT1, MT13, DT9, MT43, MT64	5	2.62
Video/Audio Recording	-	DT9, DT13, MT88	3	1.57
Documentation	-	MT18, MT22, MT32, MT45, MT65, MT68, MT81, MT89	8	4.19
Diary	-	MT1 MT13 DT7, DT9	4	2.09

According to Table 7, when the postgraduate theses focused on concept mapping are examined in terms of data collection tools, there is a general diversity observed in the studies, yet quantitative methods are predominantly used. Success tests, scales, and interviews are frequently preferred as data collection tools, while documentation, observation, diaries, video/audio recordings are identified as the least used tools. On the other hand, it is observed that in theses focused on concept maps, the subject is examined in relation to different dimensions, hence the used data collection tools are not exclusively related to concept maps.

The distribution of the theses examined within the scope of this study in terms of Department/Branch of Science is presented in Table 8.

Table 8. Distribution of Postgraduate Theses on Concept Mapping by Department/Branch of Science

Department/Branch Code	Postgraduate Theses	f	%
Elementary Education Department, Science Education Branch	MT26, MT36, MT37, MT42, MT55, MT56, MT61, MT63, MT71, MT73, MT78, MT79, MT83, MT87, MT89, MT90, MT94, MT95, MT97, MT98, MT99, DT5, DT10	23	19,83
Turkish and Social Sciences Education Department, Turkish Education Branch	MT10, DT2, DT3, MT14, MT18, MT33, MT68, DT9, DT11, DT13	10	8.62
Educational Sciences Department, Educational Programs and Instructional Sciences Branch	MT3, MT16, MT29, MT62, MT76, MT84, MT93, DT14	8	6.90
Secondary Education Science and Mathematics Fields Education Department, Biology Education Branch	MT12, MT20, MT34, MT38, MT41, MT67, MT85, DT12	8	6.90
Secondary Education Science and Mathematics Fields Education Department, Chemistry Education Branch	DT1, DT4, MT48, MT49, MT82, DT7, DT8	7	6.03
Educational Sciences Department, Measurement and Evaluation in Education Branch	MT39, MT40, MT45, MT52, MT57, DT15	6	5.17
Elementary Education Department, Mathematics Education Branch	MT9, MT280, MT51, MT54, MT80, MT96	6	5.17
Mathematics and Science Education Department, Mathematics Education Branch	MT1, MT2, MT5, MT11, MT13	5	4.31
Secondary Education Social Sciences Education Department, Geography Education Branch	MT21, MT59, MT69, MT91	4	3.45
Computer and Instructional Technologies Education Department	MT4, MT22, MT92, DT6	4	3.45
Educational Sciences Department, Educational Administration and Supervision Branch	MT47, MT65, MT74, DT16	4	3.45
Elementary Education Department, Elementary Classroom Teaching Branch	MT27, MT30, MT35, MT64	4	3.45
Elementary Education Department, Social Studies Education Branch	MT31, MT46, MT75, MT88	4	3.45
Educational Sciences Department, Educational Program Development Branch	MT60, MT70, MT100	3	2.59
Elementary School Mathematics Teaching Department	MT24, MT53, MT58	3	2.59
Secondary Education Science and Mathematics Fields Education Department, Physics Education Branch	MT44, MT50, MT66	3	2.59
Turkish and Social Sciences Education Department, Geography Education Branch	MT15, MT25	2	1.72
Mathematics and Science Education Department, Chemistry Education Branch	MT6, MT17	2	1.72
Secondary Education Social Sciences Education Department, History Education Branch	MT77	1	0.86
Secondary Education Social Sciences Education Department, Turkish Language and Literature Teaching Program	MT32	1	0.86
Philosophy and Religious Sciences Department, Religious Education Branch	MT81	1	0.86
Fine Arts Education Department, Fine Arts Teaching Branch	MT86	1	0.86
English Language Education Department	MT8	1	0.86
Special Education Department, Education of Mentally Disabled Branch	MT23	1	0.86
Special Education Department, Special Education Branch	MT43	1	0.86
Physical Education and Sports Teaching Department, Sports Education Branch	MT72	1	0.86
Basic Education Department, Preschool Teaching Branch	MT7	1	0.86

Turkish and Social Sciences Education Department, Social Studies Education Program	MT19	1	0.86
Total		116	100

When examining the distribution of theses by Department/Branch of Science in Table 8, it is determined that the theses on the topic of concept mapping are most prevalent in the field of Science Education (%19.83). However, it is also observed that there are a few theses focused on concept mapping in various other fields (Department/Branch of Science).

Conclusion and Discussion

The results obtained from this research aimed at determining the general trends of postgraduate theses related to concept mapping in terms of subject and methodology dimensions are detailed in the findings section of the study. One of the findings reached in this study is that the majority of theses related to concept mapping were prepared as MT between 2001 and 2006. Günhan (2009) supports this finding by stating that the majority of studies aiming to reveal the effect of concept mapping on success were conducted in 2006. The examined thesis studies mostly aimed to reveal the impact of concept mapping on success. For this purpose, theses mostly preferred the semi-experimental design of unequal pre-test and post-test from quantitative research methods. Another result of the research indicates that between 2001 and 2023, postgraduate theses related to concept mapping examined the subject in all levels of education, and were predominantly conducted on primary and secondary school students. However, it is observed that there is insufficient research on the topic at the primary school level.

Recommendations

Based on the results of the study, concept mapping-focused studies can be examined with unexplored dimensions, and qualitative research can be conducted on participants' views, applications, and experiences related to concept maps.

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Appendix 1. Studies evaluated in the research

No.	Imprint
MT1	Filik, H., N. (2022). <i>The effect of mathematics teaching by the computer aided concept map on the metacognition skills of 7th grade students</i> . Master Thesis. Ömer Halis Demir University, Niğde, Turkey.
MT2	Şekerci, H. (2021). <i>The effect of teaching with concept maps on seventh grade students' achievement and making connection skills regarding polygons</i> . Master Thesis. Hacettepe University, Ankara, Turkey.
MT3	Yazıcı, E. (2020). <i>The effect of using concept maps as advance organizers in english lessons on the academic achievement of undergraduate students</i> . Master Thesis. Yıldız Teknik University, İstanbul, Turkey.
MT4	Polan, Ş. (2020). <i>Investigation of the effect of static, animated and interactive concept maps on multimedia learning</i> . Master Thesis. Ege University, İzmir, Turkey.
MT5	Köken, C., B. (2020). <i>Investigation of the effect of static, animated and interactive concept maps on multimedia learning</i> . Master Thesis. Bartın University, Bartın, Turkey.
MT6	Bulut, L., Ö. (2020). <i>Determination of misconceptions of chemistry teacher candidates about solution and solubility with concept maps technique</i> . Master Thesis. Gazi University, Ankara, Turkey.
MT7	Akpolat, E., Ş. (2019). <i>Investigation of the relationship between the teacher's knowledge of using concept maps and their applications of concept maps</i> . Master Thesis. İstanbul Aydın University, İstanbul, Turkey.
MT8	Sebit, S. (2019). <i>Individual and collaborative computerized concept mapping as a pre-writing strategy: Effects on EFL students' writing</i> . Master Thesis. Boğaziçi University, İstanbul, Turkey.
MT9	Güleç, D. (2019). <i>Teaching of exponential numbers with concept and mind maps</i> . Master Thesis. Necmettin Erbakan University, Konya, Turkey.
MT10	Aydoğan, Y. (2019). <i>Effect of concept maps on speaking anxiety and improvement of speaking skills of secondary school students</i> . Master Thesis. Kütahya Dumlupınar University, Kütahya, Turkey.
MT11	Kaya, S. (2019). <i>The effect of concept map usage on the academic achievement and attitude of student's in teaching secondary school 7th grade rational numbers</i> . Master Thesis. Firat University, Elazığ, Turkey.
MT12	Öztürk, H. (2019). <i>The effect of concept maps on the teaching of biology course about substance transport in plants subject secondary 12 th grade students' achievement and recall level</i> . Necmettin Erbakan University, Konya, Turkey.
MT13	Döner, M. (2019). <i>An in-service training activity designed for mathematics teachers for developing a concept map</i> . Master Thesis. Dicle University, Diyarbakır, Turkey.
MT14	Zorpuzan, R. (2019). <i>The effect of the concept mapping on vocabulary teaching in teaching language as a foreign language</i> . Master Thesis. Abant İzzet Baysal University, Bolu, Turkey.
MT15	Can, N. (2019). <i>Evaluation of the suitability of 9th grade geography subjects in terms of concept map use with teachers' views (Konya case)</i> . Master Thesis. Necmettin Erbakan University, Konya, Turkey.
MT16	Yılmaz, D., U. (2019). <i>Effects of conducting concept map method in mathematic education to students' success, behavior and remembrance</i> . Master Thesis. Marmara University, İstanbul, Turkey.
MT17	Mert, V. (2019). <i>The effect of concept map method on academic achievement for teaching of modern atomic theory unit</i> . Master Thesis. Gazi University, Ankara, Turkey.
MT18	Pınar, F., N. (2018). <i>Presentation of theoretical knowledge about the importance of concept maps and comprehension skill in Turkish teaching with concept map varieties</i> . Master Thesis. Selçuk University, Konya, Turkey.
MT19	Yılmaz, F. (2018). <i>Social sciences study on the concept map and teaching efficiency of the unit of the "Democracy in the 6th grade"</i> . Master Thesis. Celal Bayar University, Manisa, Turkey.
MT20	Ulusoy, G. (2018). <i>The effect of concept map on teaching the concepts parthenogenesis and parthenocarp to biology teacher candidates</i> . Master Thesis. Necmettin Erbakan University, Konya, Turkey.
MT21	Gündoğan, N. (2018). <i>Impact on student achievement the use of models and concept map in teaching karst topography</i> . Master Thesis. Necmettin Erbakan University, Konya, Turkey.
MT22	Karaçorlu, A., T. (2018). <i>Opinions of teacher and student about use of concept map and infographic in the EBA platform</i> . Master Thesis. Firat University, Elazığ, Turkey.
MT23	Varol, M. (2018). <i>The effectiveness of the concept maps proposition provided by direct teaching methods for the promotion of the main characteristics of children with mild students</i> . Master Thesis. Abant İzzet Baysal University, Bolu, Turkey.
MT24	Biçer, N. (2017). <i>The impact of using concept maps on academic achievement in the sub-learned area of polygons in 7th grade maths and interviews of student</i> . Master Thesis. Gazi University, Ankara, Turkey.
MT25	Mırık, R. (2017). <i>Views of geography teachers on concept maps that took part in high school geography course books</i> . Master Thesis. Atatürk University, Erzurum, Turkey.
MT26	Akarca, T., A. (2017). <i>Representation of enhanced environmental concepts in students at different levels by group concept maps</i> . Master Thesis. Mersin University, Mersin, Turkey.
MT27	Yılmaz, M. (2017). <i>A study on the knowledge of concept maps on the part of teachers who educate children of 60-84 months</i> . Master Thesis. İstanbul Aydın University, İstanbul, Turkey.

- MT28** Özdemir, F. (2015). Concept maps usages's effect on students' academic success and attitude by teaching of the subject of square root of number at 8th grades. Master Thesis. Fırat University, Elazığ, Turkey.
- MT29** Dinçer, S., K. (2015). Using concept maps in mathematic: The effects on students' mathematical power. Master Thesis. Yıldız Teknik University, İstanbul, Turkey.
- MT30** Laçın, F. (2014). Effect of concept mapping and vee diagram on the achievement and attitude of students in statistics and probability for 8th grade in elementary. Master Thesis. Zirve University, Gaziantep, Turkey.
- MT31** Gök, Ö., A. (2014). The effect of teaching the unit called "The sources of our country" of 6th grade Social science lesson through 'concept mapping' on the success of the students. Master Thesis. Adnan Menderes University, Aydın, Turkey.
- MT32** Kahraman, H., M. (2014). The use of concept mapping in didactic texts in secondary school Turkish literature courses. Master Thesis. Dokuz Eylül University, İzmir, Turkey.
- MT33** Polatcan, F. (2013). Effect on success of grammar teaching with concept maps in 6th grades. Master Thesis. Atatürk University, Erzurum, Turkey.
- MT34** Bektüzün, B. (2013). The effects of teaching the subject fractions in biology by using concept map on the achievement of the primary students. Master Thesis. Gazi University, Ankara, Turkey.
- MT35** Türkhan, S. (2013). The influence of using concept maps on students' academic achievements while teaching Periodic Table in 8th grade Science and Technology course. Master Thesis. Uşak University, Uşak, Turkey.
- MT36** Akkuş, G. (2013). The effects of computer assisted concept map on overcoming 6th grade students' misconceptions of circulatory system. Master Thesis. Pamukkale University, Denizli, Turkey.
- MT37** Gökçen, B., B. (2012). Concept maps for the general biology course on the effects of academic achievement and attitude. Master Thesis. Onsekiz Mart University, Çanakkale, Turkey.
- MT38** Arslan, K., T. (2012). Science and technology class at the use of concept mapping as a tool for assessment. Master Thesis. Gazi University, Ankara, Turkey.
- MT39** Doğan, S. (2012). A comparison of concept map and structural grid techniques with multiple choice tests. Master Thesis. Mersin University, Mersin, Turkey.
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- MT40** Polat, B. (2011). The effects of vee diagrams, concept maps and diagnostic branched tree on attitudes to mathematic course and success and the teacher views about these means. Master Thesis. Hacettepe University, Ankara, Turkey.
- MT41** Kasapoğlu, E. (2011). The effect of teaching protein synthesis using concept maps on the academic achievement and attitudes of 12th grade high school students. Master Thesis. Selçuk University, Konya, Turkey.
- MT42** Öztürk, P., T. (2011). The effect of usage of concept maps, structured grid and diagnostic tree technics to teach the? Living things and energy relations unit? on 8th grade of primary school students? attitudes towards science and technology lesson. Master Thesis. Selçuk University, Konya, Turkey.
- MT43** Koçak, F. (2011). The effectiveness of using semantic maps in teaching autistic children concepts within the topic of family in social studies classes. Master Thesis. Selçuk University, Konya, Turkey.
- MT44** Salar, R. (2011). Determining teacher candidates? concept images about electric circuits via repertory grid and concept maps. Master Thesis. Gazi University, Ankara, Turkey.
- MT45** Kaya, G. (2011). Application of generalizability theory to fill-in concept map assessment. Master Thesis. Hacettepe University, Ankara, Turkey.
- MT46** Çolak, R. (2010). The concept map in the framework of the social science education in the teaching of historical concepts to use: The teaching of concept mapping with attitude, success, and stability analysis of the relationship between. Master Thesis. Marmara University, İstanbul, Turkey.
- MT47** Gül, P. (2010). Turkish teachers and primary school supervisor's evaluation approaches to each other: A study of concept map. Master Thesis. Gaziosmanpaşa University, Tokat, Turkey.
- MT48** Aksoy, M. (2010). The effects to the success and behaviors of the students to be taught by the concept map of solubility subject in the chemistry lessons at secondary education. Master Thesis. Selçuk University, Konya, Turkey.
- MT49** Turan, N. (2010). Comparison of alternatif assessment techniques such as concept map and tree diagram with classic techniques in terms of student success. Master Thesis. Gazi University, Ankara, Turkey.
- MT50** Kılınç, E. (2010). Analyzing the knowledge structures of secondary school students about the nature of science via the concept map. Master Thesis. Gazi University, Ankara, Turkey.
- MT51** Akkurt, Z. (2010). An investigation on pre-service teachers? associating geometric concepts by the help of concept maps. Master Thesis. Hacettepe University, Ankara, Turkey.
- MT52** Eroğlu, M., G. (2010). An analysis on the validity and reliability of concept map and structural communication grid scores. Master Thesis. Hacettepe University, Ankara, Turkey.
- MT53** Burak, B., S. (2010). Primary 6.th mathematics learning area class course geometry using concept maps and achievement of students knowledge of the effects of retention. Master Thesis. Gazi University, Ankara, Turkey.
- MT54** Müjdecı, S. (2009). The usage of concept maps as an alternative measurement evaluation instrument in the mathematics education. Master Thesis. Marmara University, İstanbul, Turkey.

- MT55** Kavak, S. (2009). Effect of using concept maps technique in college science and technology courses of an 8th class, unit? Substance states and heat? on student achievement, knowledge durability and attitude towards science. Master Thesis. Gazi University, Ankara, Turkey.
- MT56** Kılıç, E. (2009). A study of the effectiveness of concept mapping technique and gender difference on students? achievement and retention in science and technology topics and attitude toward science and technology. Master Thesis. Gazi University, Ankara, Turkey.
- MT57** Sarıgül, Z. (2009). An investigation into the effectiveness of multiple choice tests, structural communication grid and concept maps technique on the students' success in the aspect of measurement process and students' views about these techniques. Master Thesis. Abant İzzet Baysaal University, Bolu, Turkey.
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- MT58** Özdemir, A. (2009). The effects of teaching the subject fractions in maths by using concept map on the achievement of the primary 6.th grade students. Master Thesis. Gazi University, Ankara, Turkey.
- MT59** Acar, S. (2009). Empirical methodology in order to ascertain whether concept maps are effective in the success of second year high school students to learn subjects on soil for the geography class. Master Thesis. Gazi University, Ankara, Turkey.
- MT60** Erdemir, E. (2009). The meanings attributed to computer concept of the fifth grade students: Study of a concept map. Master Thesis. Gaziosmanpaşa University, Tokat, Turkey.
- MT61** Canbolat, S. (2008). The effects of using concept maps on attitudes and achievement towards science lesson. Master Thesis. Gazi University, Ankara, Turkey.
- MT62** Kapucu, N., K. (2008). The effect of use computer-based concept maps on the skill of students cognitive scenario, their achievement, retention and their attitude. Master Thesis. Muğla University, Muğla, Turkey.
- MT63** Canbolat, S. (2008). The effects of using concept maps on attitudes and achievement towards science lesson. Master Thesis. Gazi University, Ankara, Turkey.
- MT64** Yılmaz, H. (2008). The effect of concept maps on the success of primary grade 5 students in social science course. Master Thesis. Selçuk University, Konya, Turkey.
- MT65** İyilik, H. (2007). Investigation of the reliability and validity of scores obtained by using two different techniques of concept maps. Master Thesis. Hacettepe University, Ankara, Turkey.
- MT66** Açar, B. (2007). Measuring students' success about "force" by concept mapping. Master Thesis. Gazi University, Ankara, Turkey.
- MT67** Karahan, U. (2007). Application of alternative measurement and evaluation methods that are grid, diagnostic tree and concept maps within biology education. Master Thesis. Gazi University, Ankara, Turkey.
- MT68** Şenay, A. (2007). Text teaching by using concept maps. Master Thesis. Selçuk University, Konya, Turkey.
- MT69** Kocalar, A., O. (2006). The use of concept maps about middle education topics at geograph teaching. Master Thesis. Marmara University, İstanbul, Turkey.
- MT70** Tümen, S. (2006). Effects of concept mapping on students' accomplishments in language teaching (Elaziğ Balakgazi highschool sample). Master Thesis. Firat University, Elaziğ, Turkey.
- MT71** Yener, N. (2006). Teaching the subject which ecosystems are there in our environment and what is happening here by using the concept maps and their effect upon student's success and behawroure in science lesson for 7 th grade. Master Thesis. Gazi University, Ankara, Turkey.
- MT72** Demir, E. (2009). Effect of teaching technique with concept maps on learning on basketball and badminton units in physical education for the 4. and 5. classes of primary school. Master Thesis. Marmara University, İstanbul, Turkey.
- MT73** Güçlüer, E. (2006). The effect of cognitive support given by concept mapping on achievement, retention and attitude in primary science education. Master Thesis. Dokuz Eylül University, İzmir, Turkey.
- MT74** Engür, F. (2006). The effect of the method of the concept map on learning levels for teaching of physics. Master Thesis. Yeditepe University, İstanbul, Turkey.
- MT75** Gencer, P., B. (2006). The effect of concept maps about geography subjects in social knowledge lesson in sixth class (the model Ömer Nasuhi Bilmen primary School in Erzurum). Master Thesis. Atatürk University, Erzurum, Turkey.
- MT76** Gedizgil, Z. (2006). The effects of concept mapping strategy on primary school students? attitudes towards computers and motivation to computer course. Master Thesis. Ankara University, Ankara, Turkey.
- MT77** Kurada, K. (2006). The effect of concept maps on learning history lesson fon 10th grades. Master Thesis. Marmara University, İstanbul, Turkey.
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- MT78** Çağlayan, Ç. (2006). The effect of using concept maps on scholar succes of student and their learning of new concepts when teaching genetics unit of science on eighth grade. Master Thesis. Çukurova University, Adana, Turkey.
- MT79** Aykanat, F. (2005). Teaching science through computer-based maps (cell concept). Master Thesis. Gazi University, Ankara, Turkey.
- MT80** Aleyşil, D. (2005). The effect of geometry learning with the method of conception charts supported problem solving to the 7th class students' geometry thinking level. Master Thesis. Dokuz Eylül University, İzmir, Turkey.

- MT81** Başkonak, M. (2005). An example application of concept mapping technique to religious culture and morals course of secondary education 9th, 10th, and 11th grades curriculums. Master Thesis. Selçuk University, Konya, Turkey.
- MT82** Karakuzu, Z. (2005). The effect of concept mapping technique in the perception of the topic of matter and its properties of high school 1st year students. Master Thesis. Gazi University, Ankara, Turkey.
- MT83** Çatalkaya, R. (2005). The Effect of some personal differences on the success of making a concept map. Master Thesis. Abant izzet Baysal University, Bolu, Turkey.
- MT84** Ata, N. (2004). The effects of different uses of concept mapping upon the students' concept map creating level and academic achievement in ninth class mathematics curriculum. Master Thesis. Yıldız Teknik University, İstanbul, Turkey.
- MT85** Kablan, F. (2004). The effects of using concept maps on the success of high school ninth class students learning subject of cell in biology class. Master Thesis. Gazi University, Ankara, Turkey.
- MT86** Özen, R. (2004). The Effectiveness of the mind-maps in the courses of art education in the primary schools. Master Thesis. Anadolu University, Eskişehir, Turkey.
- MT87** Ersoy, N. (2004). To and the misconceptions of the 7th grade students in primary school education about "the transformations and classifications of the matters" by means of experiment method and concept map method. Master Thesis. Marmara University, İstanbul, Turkey.
- MT88** Güngör, D. (2004). The influence using knowledge and concept map on success in teaching historical concept in 5th grade primary school social studies lessons. Master Thesis. Marmara University, İstanbul, Turkey.
- MT89** Karamusaoğlu, K. (2003). Determination of misconception of science teacher candidates by means of concept map. Master Thesis. Gazi University, Ankara, Turkey.
- MT90** Üstün, P. (2003). The Effect of concept mapping technique on the success of students about solving multiple choice test questions. Master Thesis. Marmara University, İstanbul, Turkey.
- MT91** Deniz, F., Ö. (2003). Concept map's effective on student achievement in grade 9 geography course. Master Thesis. Gazi University, Ankara, Turkey.
- MT92** Akkayüz, E. (2003). Primary education 4th and 6th class students levels of forming of concept mapping. Master Thesis. Çukurova University, Adana, Turkey.
- MT93** Yıldız, G. (2003). The effects of the concept maps of 9 th grade students on their academic achievement in maths at school. Master Thesis. Yıldız Teknik University, İstanbul, Turkey.
- MT94** Özata, Ö., F. (2003). The Effect of concept maps on remediation of students misconception and remembering in science lesson in primary schools. Master Thesis. Marmara University, İstanbul, Turkey.
- MT95** Vural, M., C. (2003). The Effects of mathematics pre-knowledge, logical reasoning abilities and concept mapping techniques on the success of students about solving science problems. Master Thesis. Marmara University, İstanbul, Turkey.
- MT96** Kabaca, M., Y. (2003). Research on using concept maps in mathematics education as a measurement and assessment tool. Master Thesis. Marmara University, İstanbul, Turkey.
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- MT97** Akgündüz, D. (2002). Primary school science education the use of concept maps in 6 th grade biology subjects and their effect on success. Master Thesis. Gazi University, Ankara, Turkey.
- MT98** Öztuna, A. (2002). Influence of concept maps constructed in group cycles on academic success and conceptual development. Master Thesis. Marmara University, İstanbul, Turkey.
- MT99** Duru, M., K. (2001). The Effect of teaching with concept map and constructing concept map as groups on success and remembering of students in science lesson in primary schools. Master Thesis. Marmara University, İstanbul, Turkey.
- MT100** Dumanlı, E. (2001). The Effect of the concept maps for achievement and continuity. Master Thesis. Hacettepe University, Ankara, Turkey.
- DT1** Efil, H. (2023). The effects of concept maps used in cooperative learning model on students achievement and attitudes towards acids-bases. Doctoral Thesis. Hacettepe University, Ankara, Turkey.
- DT2** Erdil, M. (2022). The effect of courses carried out through concept mapping technique on the ability of foreign students to learn Turkish grammar. Doctoral Thesis. Gazi University, Ankara, Turkey.
- DT3** Gerek, H., G. (2022). The effect of using concept maps in teaching Turkish as a foreign language on developing students' reading skills. Master Thesis. Gazi University, Ankara, Turkey.
- DT4** Varoğlu, L. (2021). Effect of 5E learning model supported concept maps on students' understanding of chemical concepts. Doctoral Thesis. Hacettepe University, Ankara, Turkey.
- DT5** Uyar, E., K. (2017). The effects of using jigsaw I and jigsaw I technique supported by concept map on success, attitude and persistency in secondary school science lesson. Doctoral Thesis. Gazi University, Ankara, Turkey.
- DT6** Aydoğdu, Ş. (2016). The effect of digital concept maps on students' achievements and disorientation in online learning environments. Doctoral Thesis. Gazi University, Ankara, Turkey.

- DT7** Oluk, N., T. (2016). The comparison of different concept mapping tasks in chemistry education. Doctoral Thesis. Gazi University, Ankara, Turkey.
- DT8** Demirci, T. (2015). The effect of concept maps based-education methods in the subject of "Protein synthesis" of biochemistry lecture on success of the students, determination and removal of misconceptions. Doctoral Thesis. Atatürk University, Erzurum, Turkey.
- DT9** Bülbül, F. (2015). Improving the reading comprehension skill through concept mapping in education of Turkish as foreign language: An action research. Doctoral Thesis. Onsekiz Mart University, Çanakkale, Turkey.
- DT10** Sarı, A. (2014). The effects of concept mapping and computer assisted instruction on 7th grade students' misconceptions on the ontological basis. Doctoral Thesis. Marmara University, İstanbul, Turkey.
- DT11** Girgin, Y. (2012). The effect of concept map use in primary school 8th grade Turkish textbooks on students reading comprehension skills. Doctoral Thesis. Atatürk University, Erzurum, Turkey.
- DT12** Kanpolat, T. (2009). The effect of using concept map to teach global atmospheric changes on high school second level students' success and attitudes. Doctoral Thesis. Gazi University, Ankara, Turkey.
- DT13** Yaman, H. (2006). The effect of the concept map technique in grammar lessons during the second level of the primary education on the student success and the act of remembering. Doctoral Thesis. Marmara University, İstanbul, Turkey.
- DT14** Altınok, H. (2004). Cooperative learning, concept mapping, science achievement strategy use and attitude. Doctoral Thesis. Dokuz Eylül University, İzmir, Turkey.
- DT15** Şahin, B. (2003). Research on the assessment of student success by using the method of concept maps on mathematics course. Doctoral Thesis. Hacettepe University, Ankara, Turkey.
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- DT16** Altın, K. (2002). The Study of computer assisted experimental method and concept mapping method with regard to some cognitive process and level of retention. Doctoral Thesis. Marmara University, İstanbul, Turkey.
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