



Investigation of Primary School Textbooks and Cognitive Structures of Students in the Context of Thinking Skills Concepts

Nurgül Erbağcı ¹, Özlem Kaf ²

Abstract

In this study, it is aimed to examine the frequency of thinking skills concepts (problem solving, creative thinking and critical thinking) in primary school textbooks and the cognitive structures of primary school 4th grade students towards these concepts. Descriptive survey method was used in the study. Research data were collected by document analysis and word association test. In the document analysis process; life science, Turkish, mathematics, music, science, social sciences and traffic safety textbooks that were used in 1st, 2nd, 3rd, and 4th grades were examined. In the second stage, in the 2018-2019 academic year, the word association test was applied to 325 students studying in the 4th class in schools having different socioeconomic status. At the end of the research, it is seen that the concept of problem was mostly used in mathematics course, whereas in other textbooks this concept was limited in number. The concepts of creativity and criticism were used in a limited number of all textbooks. As a result of the word association test, it is concluded that the students associate the concept of problem solving with mathematics concepts and they create a weak cognitive structure for the concepts of creative thinking and critical thinking.

Keywords

Thinking skills
Textbooks
Cognitive structure
Word Association Test

Article Info

Received: 06.12.2019
Accepted: 06.02.2020
Online Published: 07.16.2020

DOI: 10.15390/EB.2020.8817

Introduction

With rapid change in science and technology, children are waiting for an unforeseen future. Preparing children for this future requires a variety of skills from a young age. In a such rapid development process, children who are raised as passive recipients of information can have difficulty in making critical choices and solving the complex problems. Teaching only theoretical knowledge to children is not sufficient to meet the expectations of the labor market or citizenship of society. Therefore, the objective of education should not be that children acquire knowledge in a passive way, but should transfer to their daily life by using their thinking skills (Baysal, Çarıkçı, & Yaşar, 2016; Fisher, 2006; Şahinel, 2015).

Thinking is the attempt to interrogate and evaluate existing information and to produce new information by associating and integrating this information (Başar, 2013). According to Beyer (1984), thinking is defined as mental techniques or skills that provide the individual with reasoning and

¹ Hasan Kalyoncu University, Faculty of Education, Department of Elementary Education, Turkey, nurgul.cakmak@hku.edu.tr

² Çukurova University, Faculty of Education, Department of Elementary Education, Turkey, ozlemkaf@cu.edu.tr

judgment. The thinking process involves shaping, deciding, remembering, evaluating, imagining, believing, and linking among all of them. Thinking is an unlimited ability of mind. The living space of the individual who cannot think in a qualified way is limited with own sensations and cannot go beyond it. On the other hand, the living space of the individual who thinks is not as much as the physical relation area but as much as the field of thought and it is unlimited (Başar, 2013; Güneş, 2012).

Thinking skills are the capacity of the individual to think consciously to reach a certain purpose. These skills provide a practical way of transferring what they have learned and made the individual make it a habit (Fisher, 2006). Thinking is not a self-developing skill in parallel with growth and maturation processes. When thinking is left to itself, it often shows a biased, distorted, prejudiced, and reductive structure. When thinking is left itself be often shows a biased, distorted, prejudiced, and reductive structure. This situation affects the quality of thinking. However, quality of life, production and studies in daily life are indicative of the quality of thoughts. The inadequate quality of thinking affects the quality of life negatively. Unskilled thoughts cause individuals to lose money and time (Gündoğdu, Eraydın, & Kızılkaya, 2016; Güneş, 2012). Thinking skills are not only required in the worlds of work, education and training, but also in building the beliefs and values of societies (Moseley et al., 2005). From an early age, the provision of thinking education provides support for children, such as criticism, questioning, alternative proposition, suspicion and testing accuracy, both in terms of knowledge and moral and personality development. The ability of children to acquire values at an early age, to explain why and how they think, and to be able to associate thinking with every field is possible with a qualified thinking education (Lipman, 1980, as cited in Mutlu & Aktan, 2011).

Thinking skills are the mental capacities that the individual uses to investigate the world, solve problems and make judgments. Therefore, the list created to define a skill that encompasses all the capacities of the human mind will be infinite. Many researchers have attempted to identify the basic skills in human thought and many different classifications have been made (Fisher, 2006). However, the most common thinking skills, especially in the education of young children, are problem-solving, creative thinking and critical thinking (Akbaba & Kaya, 2015).

Problem Solving

The problem is defined as physiological, sociological, psychological, economic, real or imaginary difficulty that restricts, compels or prevents an individual from reaching his or her purpose. The problem is a difficulty that confuses the human mind and causes uncertainty, thus disturbing the individual and so, it should be solved (Duman, 2015). Problem-solving is defined as “finding new solutions to solve a problem by going beyond simple implementation of the rules learned through previous experiences” (Korkut, 2002). According to Gail (1996), problem-solving is not just the process of finding the result of a math problem; it also includes finding solutions to the problems encountered in individual and social life (as cited in Gökkurt, Örnek, Hayat, & Soylu, 2015). The individual follows various stages in the process of problem solving. While these stages are classified differently, it can be defined as perceiving, feeling, defining the problem, establishing hypotheses about the solution, diversifying the solutions and realizing the solution (Duman, 2015). The problem-solving process requires the individual to have various skills such as social and academic skills, decision-making and communication, where his / her cognitive, sensory and dynamic characteristics are employed. These skills include many procedures such as trial and error, analysis, synthesis, cause-effect relationship (Sungur & Bal, 2016). When learning environments are designed to improve students' thinking and problem solving skills, students internalize and acquire permanent information by mentally meaningful rather than memorizing. Through problem solving activities, students can make original studies suitable for their real lives and grow up as individuals who can effectively solve problems in every area of their lives (Gürten, 2011).

Creative Thinking

Creativity, which means giving birth, involves a dynamic process (San, 2011). Creative thinking is inventive, innovative, thinking new and different solutions to problems, and providing original ideas to emerge. So, it is fluent, original, flexible and unorthodox thinking. By creating new ideas and possibilities, it allows to reach more than one correct answer (Güneş, 2012). The process of creative thinking involves four stages: preparation, incubation, enlightenment and evaluation. In the preparation stage, the problem is determined, the need or the thing to be realized is determined. In the incubation stage, the solution of the problem is performed subconsciously by using deep thinking, subliminal processes, visualization and sensation. The stage of enlightenment is the stage where the solution is found. At this stage, the solution suddenly revives in the mind, is instantaneous and develops in the richness of insights. At the final stage of the evaluation phase, the solution is tried and verified whether it is sufficient and valid. If the solution is not sufficient, it returns to the third stage (Argun, 2011). Creativity arises from the connection between feelings and thoughts, between different subjects and ideas. Creativity is possible everywhere where human intelligence is actively involved. Therefore, creative thinking is an important part of a qualified education (Fisher, 2006).

Critical Thinking

Criticism is defined as revealing the truth or mistake and real value of an idea, a work, a judgment by examining them (Türk Dil Kurumu [TDK], 2018). Critical thinking is a way of thinking that self-governs, tracks and corrects, and creates a perfect thought (Meltzoff & Cooper, 2018). This way of thinking is targeted and purposeful; it includes the factors affecting the decision-making process and the evaluation of the thinking process (Halpern, 1998). Critical thinking requires analysis of skills such as analysis, explanation, interpretation, self-regulation, evaluation and conclusion (Facione, 1990). With an education that focuses on the development of critical thinking skills, it is ensured that children grow up as individuals who are able to choose between the information they encounter through information technologies, contribute to the solution of social problems, defend democratic institutions and their natural rights, and become producers in business life (Şahinel, 2015).

In today's education programs, the growing need to raise individuals who possess problem solving and critical thinking skills and contribute to society and culture is emphasised (Milli Eğitim Bakanlığı [MEB], 2018). According to Seferoğlu and Akbıyık (2006) individuals need to observe and evaluate their thinking processes to use these skills. It is critical for primary school students to have knowledge of thinking skills concepts and to be aware of their thinking processes. The knowledge learned in primary school forms the foundation of the upper classes. It is time consuming to correct the incorrect information in the student's mind in the following periods and sometimes it may not give a positive result (Erol & Kiroğlu, 2012). In this context, students' understanding of a knowledge depends on their cognitive structure. The cognitive structure is the structuring of learned knowledge in long-term memory (Shavelson, 1971). The higher the number of categories in the cognitive structure of the student related to a concept or subject, the greater the number of relationships between categories. In this way, it is easier for students to perceive and connect the information about the concept (Uçak & Güzeldere, 2006). For example, students' cognitive structure towards the concept of "criticism, will affect their performance in the critical thinking process and their response to the criticism of their own work.

One of the most important reasons why students put misconceptions on concepts during their primary school years is textbooks (Coştu, Ayas, & Ünal, 2007). Textbooks are the main sources prepared for students at a certain level and discipline by taking into consideration the curriculum (Gülersoy, 2013). Today, the Ministry of National Education distributes the textbooks free of charge to primary school students at the beginning of each academic year. Therefore, textbooks are among the resources that all teachers in the country benefit from in their learning-teaching activities. Therefore, textbooks are one of the most important sources that all teachers in the country benefit from in their learning-teaching activities. However, textbooks are not only a resource used by teachers and students in the classroom, but also one of the most important resources that students use during their individual study.

Students, especially when working alone, may not be able to recognize mistakes made in textbooks and learn the wrong information as if they were correct (Erol & Kiroğlu, 2012).

In literature, the importance of textbooks are emphasized in various researches (Akyürek & Afacan, 2013; Gülçiçek & Yağbasan, 2004; Gülersoy, 2013). However, when the literature is examined, there are many studies aimed at students' problem-solving skills from pre-school to university level (Alver, 2005; Davey, 1994; Dubow & Tisak, 1989; D'zurilla & Sheedy, 1991; Erözkan, 2009; Gömleksiz & Bozpolat, 2012; Kesicioğlu, 2015; Öğülmüş & Kargı, 2015; Terzi, 2003; Ülger, 2012), aimed at creative thinking skills (Can Yaşar & Aral, 2011; Çeliköz, 2017; Doğanay & Sarı, 2008; Ersoy & Başer, 2009; Köksal Akyol & Salı, 2016; Leung & Silver 1997; Palamut, 2008; Sayan, 2010; Yaman & Yalçın, 2005; Yıldız & Güney Karaman, 2017; Yiğit & Erdoğan, 2008; Wang, 2012; Wu, Wu, Chen, & Chen, 2014); aimed at critical thinking skills (Akar, 2007; Akar & Kara, 2016; Ay & Akgöl, 2008; Aybek, 2006; Demir, 2006; Demirkaya & Çakar, 2012; Friend & Zubeck, 1958; Kaf-Hasırcı, 2012; Ocak & Kutlu Kalender, 2017; Kayagil & Erdoğan, 2011; Yıldız, 2011). These studies focus on empirical and relational screening to examine the thinking skills of individuals in terms of variables such as socio-economic level, age, and parental education status and empirical studies in order to develop their thinking skills. On the other hand, in the literature, there is no study examining the textbooks and the cognitive structure of primary school students' on the thinking skills concepts. It is thought that this study, which is carried out in order to reveal the frequency of using the thinking skills concepts in the textbooks and to examine the cognitive structures of the students, will alleviate this deficiency and guide the studies to be carried out. In addition, in this study, it is thought that by determining the knowledge of students about the concepts of thinking skills, it will be a guide for the activities conducted for the students to understand these concepts and to take measures to prevent misconceptions in students.

The aim of this study is to examine the concepts of thinking skills (problem solving, creative thinking and critical thinking), the frequency of use in primary school textbooks and the cognitive structures of primary school 4th grade students towards these concepts. For this purpose, the following questions have been sought:

- How often do use the concepts of “problem”, “creative” and “criticism” in primary school textbooks?
- How are the students' cognitive structures about “problem-solving”, “creative thinking” and “critical thinking”?

Method

Research Context

In this study, descriptive scanning model was applied. Descriptive screening is a research approach that aims to describe a situation that exists in the past or still as it exists (Karasar, 2013). The aim of the study is to describe the state of using thinking skills concepts (problem solving, creative thinking and critical thinking) in primary school textbooks and the cognitive structure created by primary school 4th grade students for these concepts.

Participants

The research was carried out in two stages. In the first stage of the research, the textbooks of students who were taught in primary school were examined in order to determine the frequency of using thinking skills concepts. Life science, Turkish, mathematics, music, science, social sciences and traffic safety textbooks are used in primary school courses. Life science textbook is used only in 1st, 2nd and 3rd grade; the science textbook is used only in 3rd and 4th grade; social sciences and traffic safety textbooks are only used in 4th grade. Thus, in this study, 19 textbooks were examined as documents.

In the second stage of the study, the word association test (KIT) was applied to 4th grade students in order to examine the cognitive structures of the students towards the thinking skills concepts. In the process of determination of sample, maximum variation sampling method has been used. Maximum variation sampling is the determination of different situations related to the problem examined in the universe and performing the study on different situations (Büyüköztürk, Kılıç-Çakmak, Akgün, Karadeniz, & Demirel, 2016). In this study, the sample variation was provided by considering the socioeconomic level of the students because the purpose of this study is to reveal the different cognitive structures and it is thought that these structures will be affected by the experiences of the students. Since no information on the socioeconomic level of the schools can be obtained from the National Education Directorate, the socio-economic levels of the students were determined by taking into consideration the position of the school and the opinions of the school administrators and teachers. In this context, the study was carried out with 355 students in the fourth grades from three schools in different socio-economic neighborhoods in the 2018-2019 academic year. 30 of these students were excluded from the study because they could not complete the word association test due to various reasons (inclusive student and foreign nationality). Thus, the study was continued with 325 students.

Data Collection Tools

In this study, document analysis method was used to determine the frequency of using thinking skills concepts in primary school textbooks. Document review is the process of collecting data by examining existing records and documents. This process includes finding, reading, taking notes and evaluating resources (Karasar, 2013). In this research, PDF formats of the books were tried to be reached in order to facilitate the analysis. The textbooks are given to students by the Ministry of Education at the beginning of each year. In addition, the PDF format of these books is available to teachers from the EİN (Education Informatics Network) website. PDF formats of primary school textbooks were obtained from EBA website. In order to confirm that the books were used in primary schools in Gaziantep, two teachers from different schools were asked for photographs of the pages of the books with publication and author information. In this way the books was confirmed by comparing the photographs and PDF files. Thus, a total of 19 textbooks were reached in PDF format.

In the second stage of the study, the word association test was applied to the 4th grade students in order to examine their cognitive structures related to thinking skills concepts. The word association test is one of the techniques used to reveal the cognitive structure of the individual and the relationships between the concepts in long-term memory (Bahar, Johnstone, & Sutcliffe, 1999). In the word association test, the students respond to the concepts brought to mind by a key concept within a certain period of time. It is assumed that the ordered answer given by the students to the key concept reveals the connections between the concepts of cognitive structure. It can be checked whether the students understand the concepts by looking at the number of answer words given by the KIT and the state of the answer words being related to the key concept (Bahar & Özatlı, 2003). In this study, it was aimed to reveal the cognitive structures of elementary school 4th grade students towards the concepts of thinking skills and their understanding of these concepts through KIT. Three concepts (problem solving, creative thinking and critical thinking) were determined in order to form the test. Then, the word association test has been prepared by written of each word ten times one under the other in separate pages. Figure 1 shows an example of the word association test taken from the participants. The reason why the key concept is written ten times is to ensure that the student returns to the key concept in each concept writing and to prevent the student from writing the words that the previous answer brings to mind instead of the key concept.

During the implementation of the word association test, the necessary explanations were made to the students first. Then the students were asked to write the relevant words evoked by key concepts within a minute. In many studies, it is seen that 30 seconds are given for each concept (Bahar & Özatlı, 2003; Ercan, Taşdere, & Ercan, 2010; Kaya & Akış, 2015; Keskin & Örgün, 2015). However, in cases which the age of the sample is small, a minute is given for each concept (Karatekin & Elvan, 2016; Tokcan & Yiter, 2017; Yüce & Önel, 2015). Before the application, the students were practiced with the concepts of

“game” and “science”. The application was carried out by the first researcher and lasted approximately 15 minutes in each class. Finally, the data obtained from the application were entered to excel file.

“Yaratıcı Düşünme” kavramıyla aklınıza ilk gelen kelimeleri yazınız.

- Yaratıcı düşünme: *Yenilikçi*.....
- Yaratıcı düşünme: *Yeni*.....
- Yaratıcı düşünme: *Kavram*.....
- Yaratıcı düşünme: *Hayal*.....
- Yaratıcı düşünme: *İcat*.....
- Yaratıcı düşünme: *Mucit*.....
- Yaratıcı düşünme: *Bilim*.....
- Yaratıcı düşünme: *Fen*.....
- Yaratıcı düşünme: *Disiplin*.....
- Yaratıcı düşünme: *Anlam*.....

Figure 1. Example of Word Association Test

Data Analysis

In the first stage of the research the ability of the books to be scanned using command “search” in Adobe PDF Reader was checked using various words. It was determined that only the first-grade Turkish textbook could not be scanned with “search” command. In the books that can be scanned, the words “problem”, “creat-” (creativity, creative thinking, creative) and “critic-” (criticize, criticism, critical thinking) were searched. The book that could not be scanned was examined by two different people and the results were compared and a consensus was reached. The results were recorded in a file with the sentence in which the word was found, the frequency table was created and interpreted.

The data obtained from the word association test were analyzed by the shear intervals technique proposed by Bahar et al. (1999). In the analysis process, the frequency table of the generated words which were formed for the key concepts were formed. The frequency table was examined independently by two researchers. Afterwards, a meeting was held for consensus. It was decided that the words written in sentence structure and meaningless words should not be reflected in the concept network; the frequency of the words that have the same root but differentiate by using the possessive adjectives and plural suffix (-s) could be combined. Words which are not reflected in the concept network and whose frequencies are combined are saved in a separate excel file. Thus, the answer words to be reflected to the concept network were determined. The cut-off point is determined as 10 below the highest frequency. The words above this frequency were written in the first part of the concept network, then the cut-off point was reduced by 10 and the process was continued. This process was continued until the frequency was 10 and so the whole of the generated words were added to the concept network.

Results

In this section, the findings obtained from the analysis of the data are presented below in accordance with the sub-objectives of the research.

Results Related to Textbooks

The results of document analysis in order to determine the frequency of thinking skills concepts in primary school textbooks are given below.

Table 1. Frequency of Using the Concept of "Problem Solving"

Grade level	Life Science	Turkish	Mathematics	Music	Science	Social Sciences	Traffic Safety	TOTAL
1.	0	0	10	0	...	...	...	10
2.	0	0	56	0	...	...	...	56
3.	0	1	104	0	1	...	...	106
4.	...	3	226	0	17	0	1	247
TOTAL	0	4	396	0	18	0	1	419

In order to determine the frequency of problem-solving in the primary school textbooks, the "problem" was scanned in the life science, Turkish, mathematics, music, science, social sciences and traffic safety textbooks and the results were examined. As seen in Table 1, the problem word was mostly used in the mathematics textbooks (f: 396). The term "problem" is used to indicate a situation encountered in daily life in the 4th grade Turkish textbook; in the 3rd grade Turkish textbook, it was used to express the math problem. In science textbooks, the term "problem" is used in the sections where the problem is related to science and health problems are mentioned. In the traffic safety textbook, the term "problem" is used in the definition of "data" in the dictionary section of the book. In life science and social sciences textbooks, it is not included. However, as the grade level increases, the frequency of the use of the problem word increases.

Table 2. Frequency of Use of the Concept of "Creative Thinking"

Grade level	Life Science	Turkish	Mathematics	Music	Science	Social Sciences	Traffic Safety	TOTAL
1.	0	0	0	0	...	...	...	0
2.	0	0	0	0	...	...	...	0
3.	0	0	0	0	0	...	...	0
4.	...	1	0	0	1	1	0	3
TOTAL	0	1	0	0	1	1	0	3

In order to determine the frequency of the use of creative thinking in primary school textbooks, the word "creat-" has been scanned in the textbooks and the conclusions are examined. As seen in Table 2, the word "creat-" has been used three times in the textbooks and all of these are in the 4th-grade textbooks. In the Turkish textbook, the word "creativity" is used in the section where six thinking hats techniques are mentioned; in the social sciences textbook, the concept of "creativity" is used in the definition of inspiration concept in the dictionary section. In the science textbook, it was used in the department where design was discussed. In life science, mathematics, music, and traffic safety textbooks, the word "creat-" is not included.

Table 3. Frequency of Use of the Concept of "Critical Thinking"

Grade level	Life Science	Turkish	Mathematics	Music	Science	Social Sciences	Traffic Safety	TOTAL
1.	0	0	0	0	...	...	...	0
2.	0	0	0	0	...	...	...	0
3.	0	0	0	0	0	...	...	0
4.	...	0	0	0	0	1	0	1
TOTAL	0	0	0	0	0	1	0	1

In order to determine the frequency of critical thinking in primary school textbooks, the word "critic-" has been scanned in the textbooks and the conclusions are examined. As seen in Table 3, the word "critic-" was used only once in the textbooks. In the 4th grade social sciences textbook, a film critic is mentioned in the section where the word "critic-" is used. In life science, Turkish, mathematics, music, science, and traffic safety textbooks, the word "critic-" is not included.

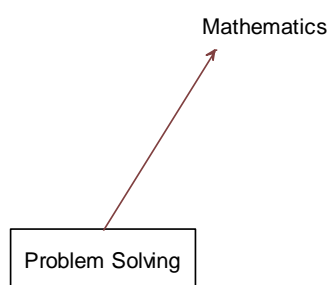
Findings Related To The Word Association Test

Table 4 shows the number of generated words and the total number of repetition of the words in the 4th-grade students in terms of "problem-solving", "creative thinking" and "critical thinking" in the word association test. The students who participated in the study produced the word for the least "problem-solving" concept (f: 514) and these words were repeated 1944 times. The 709 words created for "creative thinking" were repeated 1377 times while 690 words for "critical thinking" were repeated 1145 times.

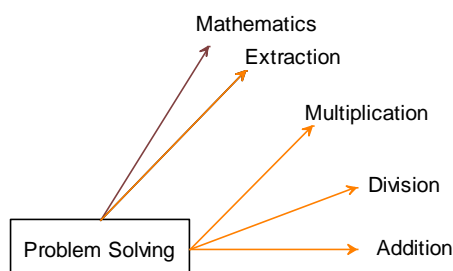
Table 4. Key Concepts and the Number of Generated Words

Key Concepts	Number of Generated Words	Number of Repetition of Generated Words
Problem Solving	514	1944
Creative Thinking	709	1377
Critical Thinking	690	1145

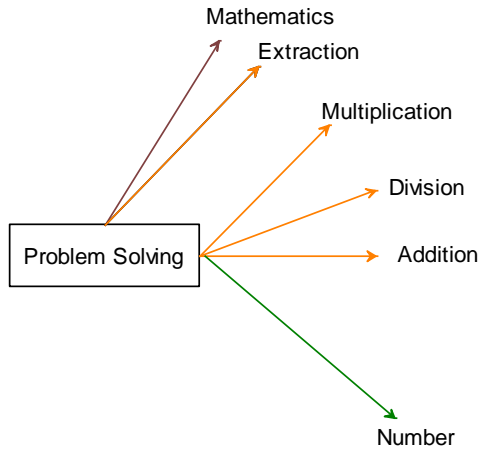
The concept network prepared by taking the frequency table into consideration and the cognitive structure of the students is given in Figure 2. In order to facilitate the follow-up of the new generated words, each cutpoint in concept networks is indicated by a different color.



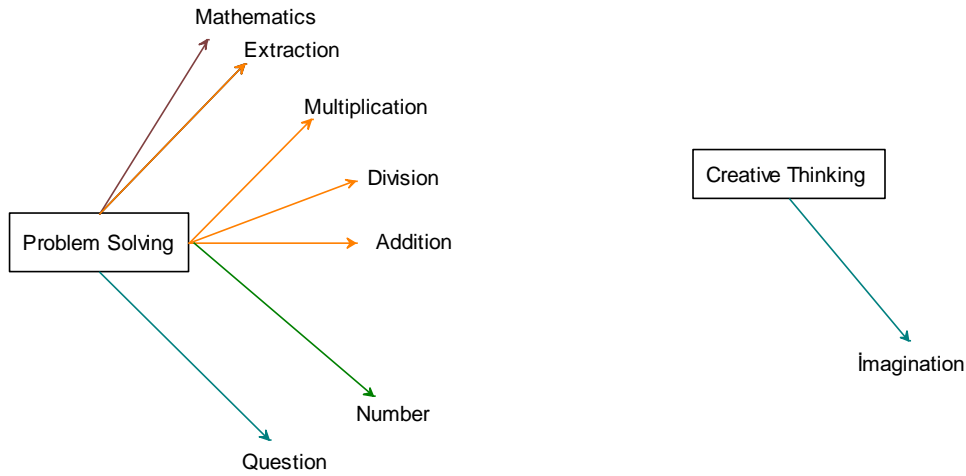
Cutpoint 150 and above



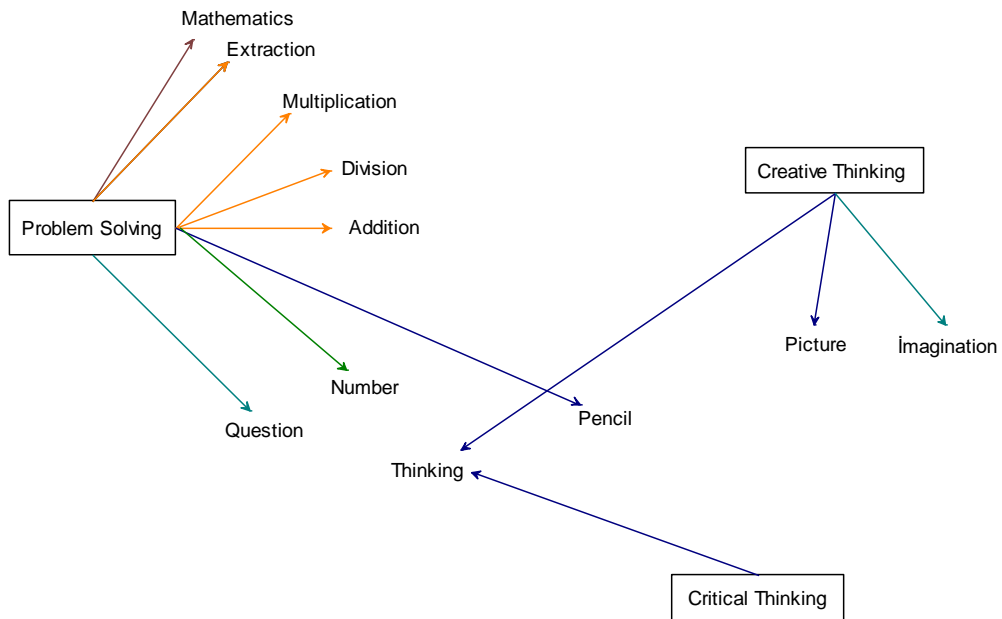
Cutpoint 140-149



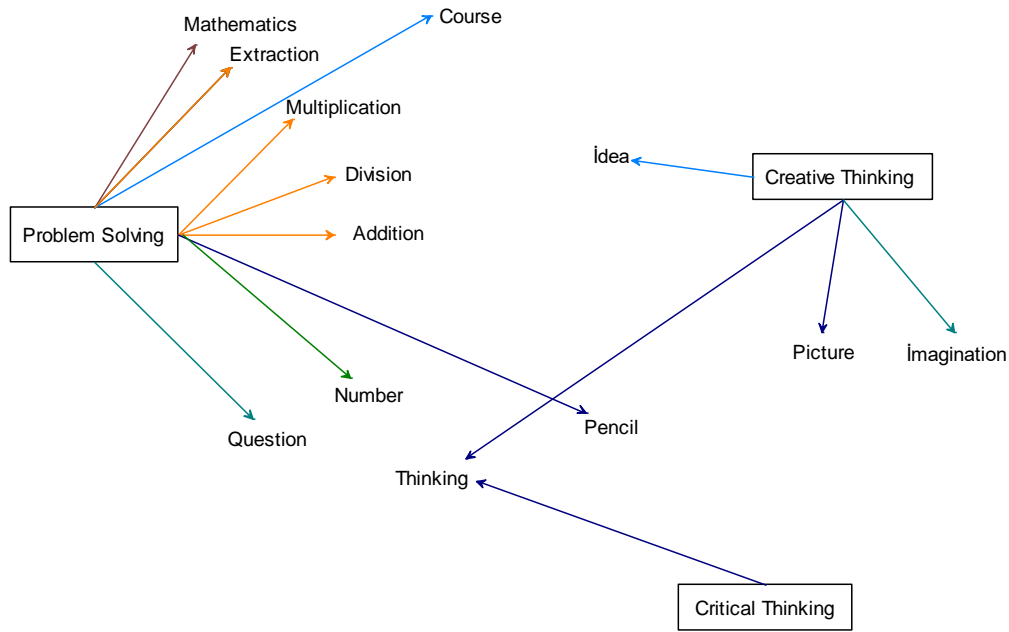
Cutpoint 60-69



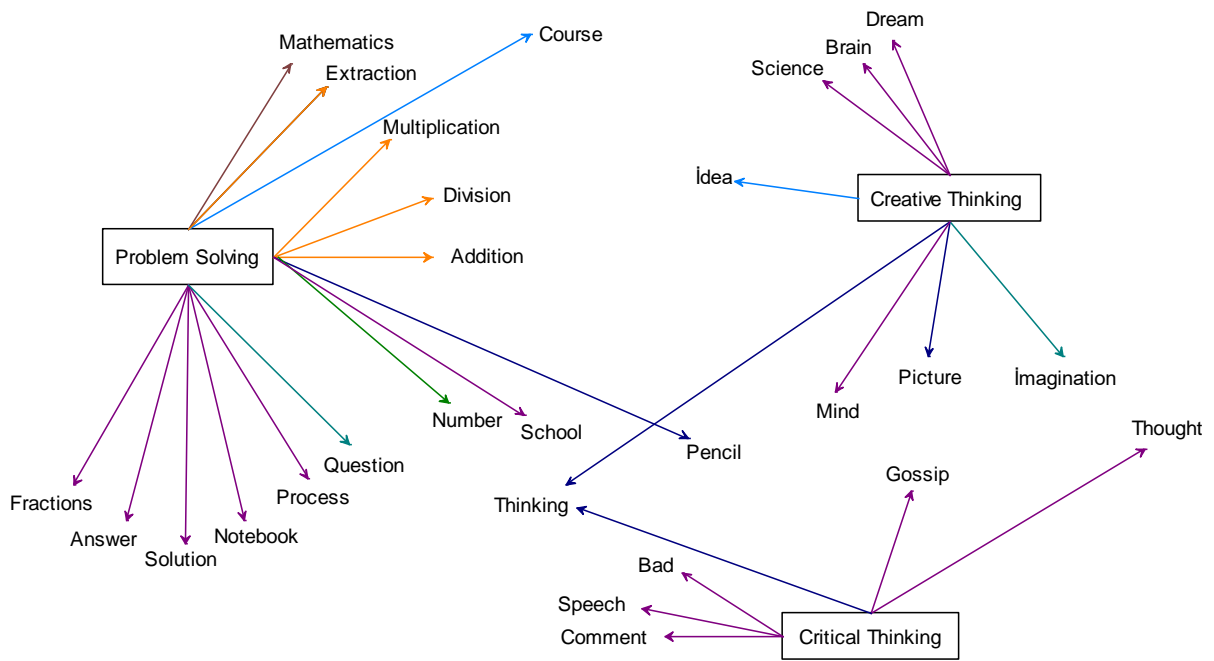
Cutpoint 50-59



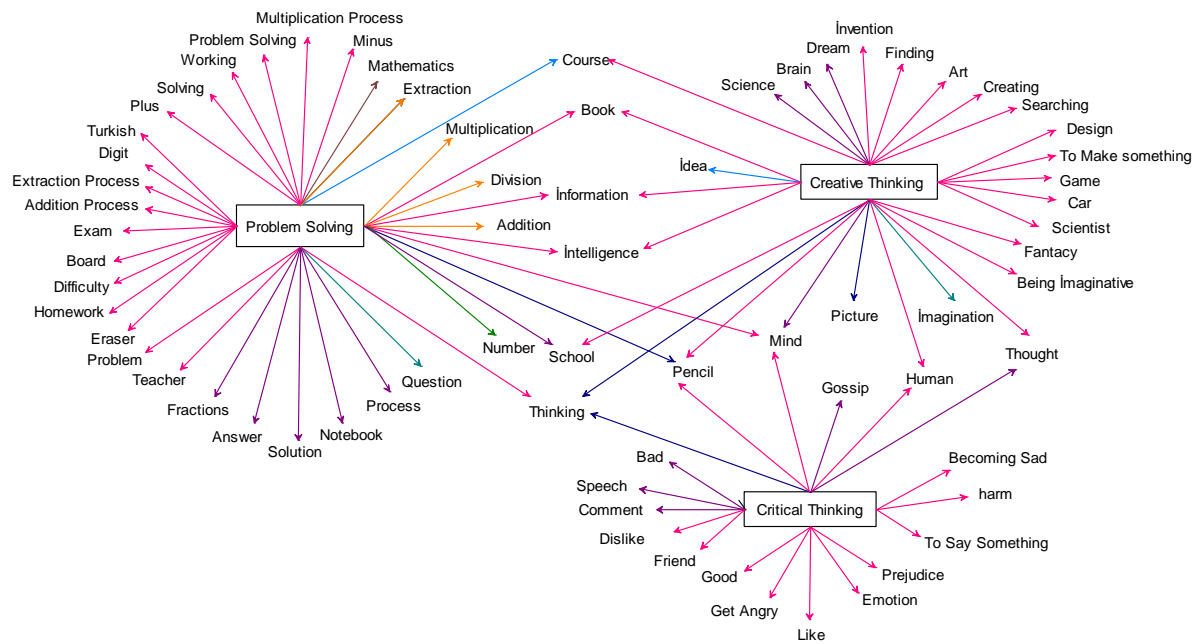
Cutpoint 40-49



Cutpoint 30-39



Cutpoint 20-29



Cutpoint 10-19

Figure 2. Concept Network Based on Key Concepts

The results seen in the concept network can be interpreted as follows;

For cut point 150 and above; In this range, the “problem-solving” key concept is associated with the “mathematical” word.

For cut point between 140-149; In this range, the “problem solving” key concept is associated with the words “extraction”, “multiplication”, “division”, and “addition”. No generated word was produced between 70-139.

For cut point between 60-69; In this range, the “problem-solving” key concept and the “number” generated word have been associated.

For cut point between 50-59; In this range, the “creative thinking” keyword emerged. The “problem-solving” key concept is associated with the “question” generated word. The “creative thinking” key concept is associated with the “imagination” generated word. The concepts in this range are yet to be broken and unrelated.

For cut point between 40-49; In this range, all the words emerged along with the concept of “critical thinking”. The key concept of “problem solving” key is associated with the word “pencil”. The concept of “creative thinking” is associated with the word “picture”. The key concept of “critical thinking” is associated with the word “thinking”. The word “thinking” is associated with the key concepts of “creative thinking” and “critical thinking” commonly.

For cut point between 30-39; in this range, the key concept of “problem-solving” is associated with the word “course”. The key concept of “creative thinking” is associated with the word “idea”. There was no relationship between the words produced.

For cut point between 20-29; the key concept of “problem” is associated with “process”, “concept”, “notebook”, “solution”, “school”, “answer”, and “fractions” generated words. The “creative thinking” key concept is associated with “science”, “brain”, “mind”, and “dream” generated words. The key concept of “Critical thinking” is associated with “thought”, “gossip”, “bad”, “speech” and “comment” generated words. There was no relationship between the words produced.

For cut point between 10-19; In this range, there has been an increase in the number of reply words associated with the key concepts as well as the number of reply words associated with the key concepts commonly. While “problem solving” is the concept most often associated with the words, “critical thinking” has been the least associated concept. With the key concept of “problem-solving”, 22 generated words (teacher, problem, eraser, intelligence, etc.), with the key concept of “creative thinking”, 20 generated words (invention, school, finding, art, etc.) and with the key concept of critical thinking, 13 generated words are associated. The generated words of “mind”, “thinking”, and “pencil” are the commonly associated words with each of these three key concepts. The “lesson”, “book”, “knowledge”, “intelligence” and “school” generated words are associated with the key words of “problem solving” and “creative thinking”, while “human” and “thought” generated words are associated with key concepts of “creative thinking” and “critical thinking”.

Discussion, Conclusion and Suggestions

As a result of the document analysis conducted to examine the frequency of thinking skills concepts in primary school textbooks, it was concluded that the concept of “problem” was mostly used in mathematics textbooks and it was used in a very limited number in the other courses. The concept of “problem” has been used in health and science subjects in life science, Turkish, science and traffic safety textbooks. In the word association test applied to the fourth grade students, a parallel result was obtained. According to the word association test results, 14 of the 37 generated words produced for the concept of “problem solving” and with a cut-off point of 10 and above are mathematical concepts, that is, problem solving is mostly associated with mathematics. According to Ülger (2012), the word “problem” often refers to mathematical problems. Ülger (2012) suggested that the education system is based on convergent thinking and that the solution of the problems focuses on a single correct answer, and that the problem was a situation that could be encountered in every field, and that the solution of the problem did not always require mathematical processing. Erözkan (2009) stated that problem solving skills of individuals is an important predictor of interpersonal relationship styles. In the literature, it was found that interpersonal problem-solving skills enable the individual to control the stress rate (Davey, 1994; Dubow & Tisak, 1989; D'zurilla & Sheedy, 1991). The lack of interpersonal problem-solving skills causes children to exhibit various behavioral problems; it results in being unable to participate in group activities and exclusion from these activities (Öğülmüş & Kargı, 2015; Kesicioğlu, 2015). In addition, 10 of the 37 responses to the “problem solving” concept in this research are the concepts they encounter in the school environment (lessons, notebooks, teachers, etc.). This may be due to the fact that the students encounter more in the school environment with the concept of “problem solving” and there is no awareness about this concept in everyday life.

In the document analysis, it was found that the concept of “creat-“ was used in Turkish, science and social sciences 4th grade textbooks with a very limited number, and it was not used in other books. However, there are many studies on developing creative thinking skills in different disciplines (Doğanay & Sarı, 2008; Leung & Silver 1997; Palamut, 2008; Sayan, 2010; Yaman & Yalçın, 2005; Yiğit & Erdoğan, 2008; Wang, 2012). Fisher (2006) stated that creativity is possible everywhere where human intelligence is actively involved, and stressed that various disciplines should be associated with each other. According to the results of the word association test applied to the students, 28 words were produced with a cutoff point of 10 and above for the “creative thinking” concept, and the most repeated answer was repeated 53 times. In other words, between the cutpoint 50 to 59, no answer to the “creative thinking” concept was produced. This situation can be interpreted that students form a weak cognitive structure towards this concept. Developing children's creative thinking skills depends on providing them with a free environment and rich stimuli (Wu et al., 2014). In this context, a reason why students form a weak cognitive structure towards this concept may be that they are not exposed to adequate stimuli.

In the document analysis, it was seen that the concept of “critic” was used only once in the textbooks of the primary school, in the section where a film critic is mentioned. This finding supports the results of the word association test. In the word association test, 19 words with a cut-off point of 10

and above for the concept of “critical thinking” were produced. No response to the concept of “critical thinking” has been produced between the cut-off point 40-49. In the literature, it is stated that there is a positive relationship between critical thinking skill and grade level (Ay & Akgöl, 2008; Demir, 2006; Friend & Zubek, 1958). In some studies in which critical thinking skills of elementary or middle school students were examined, it was found that students' critical thinking skills were insufficient (Akar, 2007; Kayagil & Erdoğan, 2011) and some studies were found to be of intermediate level (Demirkaya & Çakar, 2012; Ocak & Kutlu Kalender, 2017). In the study carried out by Yıldız (2011) with the sixth grade, it was concluded that the students' level of critical thinking was high. In this study, the finding that students have a weak cognitive structure towards critical thinking can be a finding that results from students being young. On the other hand, the fact that the concept of “critical thinking” is not introduced in a conscious and systematic way to the students at early ages leads to the risk that students will learn this concept from sources such as media, in such a way as to create misconceptions. When the words in the research are examined, it can be seen that seven of the 19 words are negative (gossip, bad, dislike, anger, prejudice, evil, sadness). This finding may be indicative of students' perception of critical thinking in a negative way.

When all the key concepts are examined together, it is seen that the generated words are mostly produced for the concept of “creative thinking” (n: 709), followed by “critical thinking” and “problem solving”. A remarkable finding here is the frequency of repeating words. Although the minimum answer is in the “problem-solving” concept, the key concept in which the number of repetition words is the highest is the “problem-solving”. This finding can be interpreted that the students constitute the cognitive structure for the most “problem solving” concept among these concepts. According to the results of the word association test, students associate “thinking”, “reason” and “pen” generated words with all three key concepts; associate “knowledge” “lesson” “book”, “ school” and “intelligence” generated words with the key concepts of “problem solving” and “creative thinking” commonly; “human” and “thought” generated words are associated the common words with the key concepts of “creative thinking” and critical thinking.

When the generated words associated with all three concepts are examined, it is seen that the generated words are very limited and superficial. However, problem solving, creative thinking and critical thinking processes are interrelated. According to Halpern (2003), creative thinking includes innovations that lead to creative results that are identified in one or more of the processes of identifying a problem, defining a problem, producing and evaluating possible solutions and deciding how well the problem is solved. In other words, creative thinking emerges in the process of problem solving. However, it is state that there is a relationship between problem solving and creative thinking (Blissett & McGrath, 1996; Greene & Noice, 1988; Karataş Öztürk, 2007; Yaman & Yalçın, 2005), between problem solving and critical thinking (Peter, 2012; Kanbay, Aslan, Işık, & Kılıç, 2013), between creative thinking and critical thinking (Birgili, 2015; Gök & Erdoğan, 2011).

Considering the results of the research, it can be suggested to include thinking skills concepts in different contexts in a way to support students' cognitive structures. For teachers, it can be suggested to increase the frequency of using these concepts in the classroom and to support the correct use of the concepts. This research has some limitations. In the study, the cognitive structures of the students, which are solely related to the concepts of “problem solving”, “critical thinking” and “creative thinking”, were examined. Similar studies can be conducted on other concepts of thinking skills. In addition, the study was limited to primary school students. A similar study can be carried out with different age groups, and students' cognitive structures for these concepts include grade level, gender, etc. It can be examined comparatively in terms of various variables. Experimental studies can be conducted by designing activities where students' cognitive structures are developed.

References

- Akar, C. (2007). *İlköğretim öğrencilerinde eleştirel düşünme becerileri* (Unpublished doctoral dissertation). Gazi University, Ankara.
- Akar, C., & Kara, M. (2016). İlkokul 4. Sınıf öğrencilerinin eleştirel düşünme becerilerinin bazı değişkenlere göre değerlendirilmesi. *Uluslararası Türkçe Edebiyat Kültür Eğitim (Teke) Dergisi*, 5(3), 1339-1355.
- Akbaba, A., & Kaya, B. (2015). Okul öncesi öğrencilerinin düşünme becerilerinin gelişmesine yönelik öğretmen görüşleri. *Elektronik Sosyal Bilimler Dergisi*, 14(55), 148-160.
- Akyürek, E., & Afacan, Ö. (2013). İlköğretim 8. sınıf öğrencilerinin "hücre bölünmesi ve kalıtım" ünitesindeki kavram yanlışlarının tespiti ve anoloji ile kavramsal değişim metinleri kullanılarak giderilmesi. *Journal of Kirsehir Education Faculty*, 14(1), 175-193.
- Alver, B. (2005). Üniversite öğrencilerinin problem çözme becerileri ve akademik başarılarının çeşitli değişkenlere göre incelenmesi. *Eğitim Bilimleri Dergisi*, 21(21), 75-88.
- Argun, Y. (2011). *Okul öncesi dönemde yaratıcılık ve eğitim* (2nd ed.). Ankara: Anı Yayıncılık.
- Ay, Ş., & Akgöl, H. (2008). Eleştirel düşünme gücü ile cinsiyet, yaş ve sınıf düzeyi. *Kuramsal Eğitimbilim Dergisi*, 1(2), 65-75.
- Aybek, B. (2006). *Konu ve beceri temelli eleştirel düşünme öğretiminin öğretmen adaylarının eleştirel düşünme eğilimi ve düzeyine etkisi* (Unpublished doctoral dissertation). Çukurova University, Adana.
- Bahar, M., & Özatlı, N. S. (2003). Kelime iletişim test yöntemi ile lise 1. sınıf öğrencilerinin canlıların temel bileşenleri konusundaki bilişsel yapılarının araştırılması. *Balıkesir Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, 5(2), 75-85.
- Bahar, M., Johnstone, A. H., & Sutcliffe, R. G. (1999). Investigation of students' cognitive structure in elementary genetics through word association tests. *Journal of Biological Education*, 33(3), 134-141.
- Başar, H. (2013). *Nasıl düşünelim*. Ankara: Pegem Akademi.
- Baysal, Z. N., Çarıkcı, S., & Yaşar, E. B. (2016). Sınıf öğretmenlerinin düşünme becerileri öğretimine yönelik farkındalıkları. *Eğitimde Nitel Araştırmalar Dergisi*, 5(1), 7-28.
- Beyer, B. K. (1984). Improving thinking skills: defining the problem. *The Phi Delta Kappan*, 65(7), 486-490.
- Birgili, B. (2015). Creative and critical thinking skills in problem-based learning environments. *Online Submission*, 2(2), 71-80.
- Blissett, S. E., & McGrath, R. E. (1996). The relationship between creativity and interpersonal problem-solving skills in adults. *The Journal of Creative Behavior*, 30(3), 173-182.
- Büyüköztürk, Ş., Kılıç-Çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2016). *Bilimsel araştırma yöntemleri*. Ankara: Pegem Yayınları.
- Can Yaşar, M., & Aral, N. (2011). Altı yaş çocuklarının yaratıcı düşünme becerilerine sosyo-ekonomik düzey ve anne baba öğrenim düzeyinin etkisinin incelenmesi. *Kuramsal Eğitimbilim Dergisi*, 4(1), 137-145.
- Coştu, B., Ayas, A., & Ünal, S. (2007). Kavram yanlışları ve olası nedenleri: Kaynama kavramı. *Kastamonu Eğitim Dergisi*, 15(1), 123-136.
- Çeliköz, N. (2017). Okulöncesi dönem 5-6 yaş çocukların yaratıcılık düzeylerinin incelenmesi. *Journal of Educational Research*, 2(1), 1-25.
- Davey, G. C. (1994). Worrying, social problem-solving abilities, and social problem-solving confidence. *Behaviour Research and Therapy*, 32(3), 327-330.
- Demir, M. K. (2006). İlköğretim dördüncü ve beşinci sınıf öğrencilerinin sosyal bilgiler derslerinde eleştirel düşünme düzeylerinin çeşitli değişkenler açısından incelenmesi. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi*, 26(3), 155-170.

- Demirkaya, H., & Çakar, E. (2012). İlköğretim yedinci sınıf öğrencilerinin eleştirel düşünme becerilerinin değişkenlere göre incelenmesi. *Ege Eğitim Dergisi*, 2(13), 33-49.
- Doğanay, A., & Sarı, M. (2008). Öğretmen gözüyle yeni sosyal bilgiler programı: Adana ilinde bir araştırma. *İlköğretim Online*, 7(2), 468-484.
- Dubow, E. F., & Tisak, J. (1989). The relation between stressful life events and adjustment in elementary school children: The role of social support and social problem-solving skills. *Child Development*, 60(6), 1412-1423.
- Duman, B. (2015). *Neden beyin temelli öğrenme?*. Ankara: Pegem A Yayıncılık.
- D'zurilla, T. J., & Sheedy, C. F. (1991). Relation between social problem-solving ability and subsequent level of psychological stress in college students. *Journal of Personality and Social Psychology*, 61(5), 841.
- Ercan, F., Taşdere, A., & Ercan, N. (2010). Kelime ilişkilendirme testi aracılığıyla bilişsel yapının ve kavramsal değişimin gözlenmesi. *Türk Fen Eğitimi Dergisi*, 7(2), 136-154.
- Erol, B., & Kıroğlu, K. (2012). Hayat bilgisi ders kitaplarının dil ve anlatım yönünden değerlendirilmesi. *Selçuk Üniversitesi Türkiyat Araştırmaları Dergisi*, 32, 155-176.
- Erözkan, A. (2009). Lise öğrencilerinde kişilerarası ilişki tarzlarının yordayıcıları. *Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 21, 543-551.
- Ersoy, E., & Başer, N. (2009). İlköğretim 6. sınıf öğrencilerinin yaratıcı düşünme düzeyleri. *Uluslararası Sosyal Araştırmalar Dergisi*, 2(9), 128-137.
- Facione, P. (1990). *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction (The Delphi Report)*. Retrieved from <https://www.researchgate.net/>
- Fisher, R. (2006). Thinking skills. In J. Arthur, T. Grainger, & D. Wray (Eds.), *Learning to teach in the primary school*. New York: Routledge Falmer.
- Friend, C. M., & Zubek, J. P. (1958). The effects of age on critical thinking ability. *Journal of Gerontology*, 13(4), 407-413
- Gök, B., & Erdoğan, T. (2011). Sınıf öğretmeni adaylarının yaratıcı düşünme düzeyleri ve eleştirel düşünme eğilimlerinin incelenmesi. *Journal of Faculty of Educational Sciences*, 44(2), 29-52.
- Gökkurt, B., Örnek, T., Hayat, F., & Soylu, Y. (2015). Öğrencilerin problem çözme ve problem kurma becerilerinin değerlendirilmesi. *Bartın Üniversitesi Eğitim Fakültesi Dergisi*, 4(2), 751-774.
- Gömlüksiz, M. N., & Bozpolat, E. (2012). İlköğretim 4. ve 5. sınıf öğrencilerinin problem çözme becerilerine ilişkin görüşlerinin değerlendirilmesi. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, 2(12), 23-40.
- Greene, T. R., & Noice, H. (1988). Influence of positive affect upon creative thinking and problem solving in children. *Psychological Reports*, 63(3), 895-898.
- Gündoğdu, K., Eraydın, Ö., & Kızılkaya, A. (2016). 2000-2015 yılları arasında düşünme eğitimi alanında akademik eğilimler. *Adnan Menderes Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 3(2), 48-61.
- Gülçiçek, Ç., & Yağbasan, R. (2004). Basit sarkaç sisteminde mekanik enerjinin korunumu konusunda öğrencilerin kavram yanlışları. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi*, 24(3), 23-38.
- Gülersoy, A. E. (2013). İdeal ders kitabı arayışında sosyal bilgiler ders kitaplarının bazı özellikler açısından incelenmesi. *International Journal of New Trends in Arts, Sports & Science Education*, 2(1), 8-26.
- Güneş, F. (2012). Öğrencilerin düşünme becerilerini geliştirme. *Türklük Bilimi Araştırmaları*, 32(32), 127-146.
- Gürten, E. (2011). Probleme dayalı öğrenme. In Ö. Demirel (Ed.), *Eğitimde yeni yönelimler*. Ankara: Pegem A Yayıncılık.
- Halpern, D. F. (1998). Teaching critical thinking for transfer across domains: disposition, skills, structure training, and metacognitive monitoring. *American Psychologist*, 53(4), 449.

- Halpern, D. F. (2003). Thinking critically about creative thinking. In M. A. Runco (Ed.), *Perspectives on creativity research. Critical creative processes* (p. 189–207). New York: Hampton Press.
- Kaf-Hasırcı, Ö. (2012). Okul öncesi öğretmen adaylarının öğrenme stilleri ile eleştirel düşünme eğilimleri arasındaki ilişki. In 3. *Uluslararası Okul Öncesi Eğitimi Kongresi* (pp. 269-270).
- Kanbay, Y., Aslan, Ö., Işık, E., & Kılıç, N. (2013). Hemşirelik lisans öğrencilerinin problem çözme ve eleştirel düşünme becerileri. *Journal of Higher Education ve Science*, 3(3), 244-251.
- Karasar, N. (2013). *Bilimsel araştırma yöntemi*. Ankara: Nobel Yayıncılık.
- Karataş Öztürk, S. (2007). *Yaratıcı düşünmeye dayalı öğrenme yaklaşımının öğrencilerin yaratıcı düşünme ve problem çözme becerilerine etkisi* (Unpublished master's thesis). Osmangazi University, Eskişehir.
- Karatekin, K., & Elvan, Ö. (2016). 8. sınıf öğrencilerinin demokrasi kavramına ilişkin bilişsel yapıları. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, 2(16), 1405-1431.
- Kaya, B., & Akış, A. (2015). Coğrafya öğrencilerinin “hava” kavramıyla ilgili bilişsel yapılarının kelime ilişkilendirme testi ile belirlenmesi. *Turkish Studies*, 10(7), 557-574.
- Kayagil, S., & Erdoğan, A. (2011). Bazı değişkenlerin ilköğretim yedinci sınıf öğrencilerinin eleştirel düşünme becerilerini yordama gücü. *Selçuk Üniversitesi Ahmet Keleşoğlu Eğitim Fakültesi Dergisi*, 31, 321-334.
- Kesicioğlu, O. S. (2015). Okul öncesi dönem çocukların kişilerarası problem çözme becerilerinin incelenmesi. *Eğitim ve Bilim*, 40(177), 327-342.
- Keskin, E., & Örgün, E. (2015). Kelime ilişkilendirme testi aracılığıyla sürdürülebilir turizm olgusunun kavramsal. *Journal of Tourism And Gastronomy Studies*, 3(1), 30-40.
- Korkut, F. (2002). Lise öğrencilerinin problem çözme becerileri. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 22, 177-184.
- Köksal Akyol, A., & Salı, G. (2016). Anasınıfına, ilköğretime ve liseye devam eden çocukların yaratıcılıklarının incelenmesi. *Journal of Theoretical Educational Science*, 9(3), 379-399.
- Leung, S. S., & Silver, E. A. (1997). The role of task format, mathematics knowledge, and creative thinking on the arithmetic problem posing of prospective elementary school teachers. *Mathematics Education Research Journal*, 9(1), 5-24.
- Meltzoff, J., & Cooper, H. (2018). Introduction. In J. Meltzoff & H. Cooper (Ed.), *Critical thinking about research: Psychology and related fields* (pp. 3-8). Washington, DC, US: American Psychological Association.
- Milli Eğitim Bakanlığı. (2018). *Hayat bilgisi dersi öğretim programı (1-8.sınıflar)*. Ankara: Milli Eğitim Bakanlığı İlköğretim Genel Müdürlüğü.
- Moseley, D., Baumfield, V., Elliott, J., Higgins, S., Newton, D. P., Miller, J., ... & Gregson, M. (2005). *Frameworks for thinking: A handbook for teaching and learning*. Cambridge: Cambridge University Press.
- Mutlu, E., & Aktan, E. (2011). Okul öncesi öğretmenlerinin düşünme eğitimi ile ilgili tutumlarının incelenmesi. *Türk Eğitim Bilimleri Dergisi*, 9(4), 799-828.
- Ocak, İ., & Kutlu Kalender, M. D. (2017). 6. sınıf öğrencilerinin eleştirel düşünme becerilerinin çeşitli değişkenler açısından incelenmesi (Kütahya ili örneği). *Kastamonu Eğitim Dergisi*, 25(4), 1587-1600.
- Öğülmüş, S., & Kargı, E. (2015). The interpersonal cognitive problem solving approach for preschoolers. *Turkish Journal of Education*, 4(1), 19-28.
- Palamut, İ. (2008). *Hikaye okumanın ilköğretim öğrencilerinin yaratıcılık düzeylerine ve akademik başarılarına etkisi* (Unpublished doctoral dissertation). Dokuz Eylül University, İzmir.
- Peter, E. E. (2012). Critical thinking: Essence for teaching mathematics and mathematics problem solving skills. *African Journal of Mathematics and Computer Science Research*, 5(3), 39-43.

- San, İ. (2011). Yaratıcılıkta temel kavramlar. In A. Öztürk (Ed.). *Okul öncesinde yaratıcılık* (pp. 1-15). Eskişehir: Anadolu Üniversitesi Yayınları.
- Sayan, Y. (2010). *İlköğretim dördüncü sınıf fen ve teknoloji dersi için geliştirilen materyallerin yaratıcı düşünme becerisi, öz kavramı ve akademik başarı üzerindeki etkisi* (Unpublished doctoral dissertation). Dokuz Eylül University, İzmir.
- Seferoğlu, S. S., & Akbıyık, C. (2006). Eleştirel düşünme ve öğretimi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 30(30), 193-200.
- Shavelson, R. J. (1971). The Theory of Directed Graphs: Some Applications to Research on Teaching, Research and Development Memorandum No. 71, Stanford Center for Research and Development in Teaching, Stanford, Calif.
- Sungur, G., & Bal, P. N. (2016). Analysis of 4th grade students' problem solving skills in terms of several variables. *Journal of Education And Practice*, 7(14), 1-9.
- Şahinel, S. (2015). Eleştirel düşünme. In Ö. Demirel (Ed.), *Eğitimde yeni yönelimler*. Ankara: Pegem A Yayıncılık.
- Terzi, Ş. (2003). Altıncı sınıf öğrencilerinin kişiler arası problem çözme beceri algıları. *Gazi Üniversitesi Türk Eğitim Bilimleri Dergisi*, 1(2), 221-232.
- Tokcan, H., & Yiter, E. (2017). 5. sınıf öğrencilerinin doğal afetlere ilişkin bilişsel yapılarının kelime ilişkilendirme testi (kit) aracılığıyla incelenmesi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, 18(1), 115-129.
- Türk Dil Kurumu. (2018). *Genel açıklamalı sözlük*. Retrieved from <https://sozluk.gov.tr/>
- Uçak, N. Ö., & Güzeldere, Ş. O. (2006). Bilişsel yapının ve işlemlerin bilgi arama davranışı üzerine etkisi. *Türk Kütüphaneciliği*, 20(1), 7-28.
- Ülger, K. (2012). Öğrencilerin yaratıcı düşünme becerileri ile problem çözme becerileri arasındaki ilişki. *E-International Journal of Educational Research*, 3(2), 50-62.
- Wang, A. Y. (2012). Exploring the relationship of creative thinking to reading and writing. *Thinking Skills and Creativity*, 7(1), 38-47.
- Wu, H. Y., Wu, H. S., Chen, I. S., & Chen, H. C. (2014). Exploring the critical influential factors of creativity for college students: A multiple criteria decision-making approach. *Thinking Skills and Creativity*, 11, 1-21.
- Yaman, S., & Yalçın, N. (2005). Fen bilgisi öğretiminde probleme dayalı öğrenme yaklaşımının yaratıcı düşünme becerisine etkisi. *İlköğretim Online*, 4(1), 42-52.
- Yıldız, C., & Güney Karaman, N. (2017). Erken çocukluk döneminde yaratıcılık ve bakış açısı alma. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi*, 50(2), 33-58.
- Yıldız, N. (2011). *İlköğretim altıncı sınıf öğrencilerinin fen ve teknoloji dersinde eleştirel düşünme düzeylerinin çeşitli değişkenler açısından incelenmesi* (Unpublished doctoral dissertation). Selçuk University, Konya.
- Yiğit, E. Ö., & Erdoğan, T. (2008). Sosyal bilgiler dersinde uygulanan öyküleştirme yönteminin ilköğretim altıncı sınıf öğrencilerinin yaratıcı düşünme düzeylerine etkisi. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 17(3), 399-416.
- Yüce, Z., & Önel, A. (2015). Fen bilgisi öğretmen adaylarının biyoçeşitliliğe ilişkin kavramsal ilişkilendirme düzeyleri. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, 15(1), 326-341.