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Investigation of 6th Grade Students' Cognitive Structures Towards the Concepts of Barcode, Banderol, Patent, Piracy, R&D, and Copyright

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Abstract: Concepts It is where the foundation of scientific knowledge and thought structures are laid. Thanks to concepts, distinctions or generalisations about an event or an entity are formed and thought structures are formed in our minds. In this study, it was aimed to determine the associations in the minds of secondary school 6th grade students about the concepts of barcode, banderole, patent, pirate, piracy, R&D, copyright in the 4th unit of the 6th grade social studies textbook and to determine the existing misconceptions. In order to determine the cognitive structures and misconceptions of the students, scanning technique was used as a method. The participants of the study were 60 6th grade students studying at Nazmiye Demirel Secondary School in Isparta city centre in the 2022-2023 academic year. After this test was applied to the students, the words obtained based on the concepts were analysed in detail and then a frequency table showing the frequency of repetition of these words was prepared. Based on the frequency table, cut-off points were determined and concept networks were created. According to the results of the research, when the frequency of association of the concepts in the minds of the students was analysed, it was determined that the key concept that produced the most words was the concept of piracy with 269 words. As can be seen from the table, it was also determined that the most misconceptions existed in the words evoked by this keyword. As a result of the research, it was determined that the keyword with the least number of words produced was the concept of banderole with 143 words. It is predicted that students have both misconceptions about the concept of banderole and learning deficiencies due to insufficient associations.

Keywords: Word Association, Social Studies, Misconceptions, Cognitive Structure

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Introduction

Social Studies course is an interdisciplinary and unified version of the subjects of social sciences (Price, 1965, p.

7), which are related to each other (Çetin, 2013; Keskin, 2019; Tay, 2018). Social studies is a course that enables children to discover themselves and the world, as well as to connect with real life (Barr, 1997). The subject of the Social Studies course consists of important social sciences such as History, Geography, Civics, Sociology, Anthropology, Law (Deveci, Köse & Bayır, 2014; Aslan & Safran, 2016; Sönmez, 2010; Tay, 2018). Social studies as a concept in the world was first used in the early 20th century in the USA in 1913 (Keskin, 2019, p.4). Thomas Jesse Jones mentioned the social studies course for the first time in a magazine called Southern Workman (İnan, 2019, p.12.). According to the definition of the National Council for the Social Studies (NCSS) (1992); "Social studies is a field of study that combines art, literature, and social sciences with an interdisciplinary approach to gain citizenship competencies." (Doğanay, 2008, p. 79; Tay, 2018, p. 6).

In Turkey, the most comprehensive definition of the social studies course is provided in the MEB (2005) Program. According to the MEB (2005), social studies is a course inspired by the concept of collective education that focuses on the contents of social sciences and civic knowledge such as history, geography, economics, political science, anthropology, psychology, philosophy and law, and combines these contents in the context of units or themes in order to fulfill the requirements of being an individual and to guide students; where individuals' human relations and their relationship with the natural environment are examined on the common ground of past, present and future; and is prepared with the inspiration of collective education. In essence, social science subjects are organized at a level that students can understand (Şimşek, 2020, p. 3; Koyuncu, 2015, p. 10).

Social studies as a subject was first taught in the United States. All changes and developments about the curriculum are made by the National Council for Social Studies (NCSS), which was established in 1921 (İnan, 2019, p.14; Aslan & Safran, 2016). In our country, the first time a course called social studies was started to be taught in 1968 (Akpınar & Kaymakçı, 2012, p. 608; Çatak, 2020, p. 24; Kalaycı & Baysal, 2020, p. 108; Yalçın & Akhan, 2019; İnan, 2019, p. 12). Subsequently, some changes were made in the program in 1998, 2005, 2017 and 2018 (Kalaycı & Baysal, 2020, p. 108).

In the content of the social studies course, there are various concepts in the context of being an education-training program (Joubish & Khurram, 2011), whose main theme is human and society, blending social sciences and serving multiple purposes (Çetin, 2003; Sönmez, 2010; Deveci, 2014; Safran, 2008; Tay, 2018; Tokcan, 2015). The most commonly agreed definition of what a concept is that it is the most basic form of knowledge and abstract images that live and are represented in our minds (Beyer & Penna 1971; Braisby, 1999, p. 321; Carey, 2009 p. 220; Fancett, 1968, p. 4; Klausmeıer, 1992; Malatyalı & Yılmaz, 2010, p. 321; Yazıcı & Samancı, 2003, p. 158). Bruner stated the concept not as an entity but as a relationship (Matsumoto, 2017, p. 132; Richard, 1968, p.10). Bourneun stated that by combining and classifying concepts with experience, new concepts are born and existing concepts change and develop (Tabachnickh, 1970 p. 9).

By perceiving, interpreting, assimilating or rearranging a newly encountered event, object or idea, the new concept is either added to the existing concept or a different new concept is created. Concepts are the

foundation of scientific knowledge and thought structures (Çaycı, Demir, Başaran & Demir, 2007, p. 624; Yılmaz & Çiviler, 2012, p. 2). Thanks to concepts, distinctions or generalizations about an event or an entity are formed, thought structures are formed in our minds and certain categories are formed, but it would be incomplete if we define concepts only as a category or classification process (Fancett, Johns, Hickman & Price, 1968, p. 4). Because concept learning is the beginning of all cognitive processes and classification is only one of the many functions of concepts. Considering that concepts are in constant interaction with each other, it is a necessity to examine concepts in relation to each other (Solomon, Medin & Lynch, 1999 p. 99).

In the study conducted by Kalaycı and Baysal (2020), when the general objectives of the social studies course are examined, it is seen that concept teaching is included as an objective and always maintains its importance according to the 2005, 2017 and 2018 programs, but compared to the 2005 program, the other programs are a little behind in guiding the teacher in concept teaching. In MONE (2018), in the section of the issues to be considered at the point of implementation of the social studies program, in Article 5, it is emphasized that concept teaching is important directly in the course, for this reason, generalizations and different concept teaching strategies should be used in concept teaching, and attention should be paid to identifying and eliminating concepts, confusion and misconceptions.

Concept learning starts in childhood and continues throughout life (Akcay et al., 2023; Antonio & Prudente, 2022; Bertiz & Kocaman Karoğlu, 2020; Cakir, Ozturk, Unal, 2019; Hwang et al., 2021; Kim & Anderson, 2023; Maddah, 2021; Ozturk, 2023; Ozturk, Kinik, & Ozturk, 2023; Ozturk & Susuz, 2023; Peifer & Taasoobshirazi, 2022; Rogti, 2021). The primary and secondary school period is very important in the learning of concepts. Because the child starts his/her first concept learning at school together with the environment (Yılmaz & Çiviler, 2012). While there are concepts acquired spontaneously and randomly in the environment, there are concepts taught purposefully with certain rules at school. For this reason, sometimes the concept learned spontaneously and the concept learned at school may conflict or the concept learned at school may be incorrectly structured in the student's mind. This situation is called misconception. In other words, misconception is when a concept is constructed and learned differently from valid and commonly accepted scientific knowledge (Demirkaya & Karacan, 2016, p.40). The most common problem in concept teaching is misconceptions, which are a problem for both the learner and the instructor (Yazıcı & Samancı, 2003).

It is seen that misconceptions are named differently in domestic and foreign literature and some of them are as follows: Primitive beliefs, erroneous ideas, alternative concept, preconceptions, instant reasoning, persistent traps, spontaneous ideas, alternative frameworks and children's science (Ercan, Taşdere & Ercan, 2010, p. 137). According to Novak (1987), misconstruing the context between two concepts and the conflict between what is perceived and what is a real cause misconception (misunderstandings) and if they are not corrected, they cause incompatibility in new learning. When students encounter some problem situations, they will need to understand and use concepts to solve them (Yazıcı & Samancı, 2003). If these concepts do not have the meaning agreed upon and determined by experts, misconceptions will emerge and students will resist the change of alternative concepts used (Schmidith, 1997; Sözen & Bolat, 2014, p.506). Therefore, teachers should recognize

misconceptions in students and correct them immediately (Novak, 1987, p. 359).

Children begin to form concepts from an early age and if the newly learned concept is compatible with the old concept, the new concept is formed. In this process, there are two other possibilities; either mislearning, i.e. misconception, occurs or the knowledge cannot be formed at all. Concepts and misconceptions occur in two ways. The first one is the spontaneous, environment-based mislearning that the child learns spontaneously before formal education; the second one is the misconstruction of concepts while in formal education with a conscious education at school (Bozoran, 2008; Erdener, 2009). Concepts can be concrete or abstract. The fact that they are abstract necessitates the correct and adequate learning of these concepts. In order for students to internalize the Social Studies course, it is important to learn these concepts well and not to allow misconceptions (Çetin, 2013; Karakuş, 2009; Tokcan, 2015). The social studies course, which includes various subject areas, can be perceived as a mass of verbal and abstract information and may lead students to memorization. In order to realize meaningful learning, attention should be paid to the correct and real learning of concepts. The teaching of the course should start with easy-to-perceive concepts and then move on to difficult and complex concepts (Sözer, 1998, p.76-77).

Purpose of the Study

In this study, it was aimed to determine the words that middle school 6th grade student's associate with the concepts of barcode, banderole, copyright, piracy, R&D and the existing misconceptions within the scope of Science and Technology learning area in the 6th grade social studies textbook 4th unit.

Method

In this research, which aims to determine students' cognitive structures and misconceptions, word association test was used. Word association tests are one of the various methods used to identify misconceptions (Çelikkaya & Şarlayan, 2019, p. 1; Yılmaz & Çiviler, 2012, p. 3). Word association was first proposed by Gal-Ton. Then, Carl Gustav Jung developed word association tests to use individuals' associations between concepts in research. According to Jung, people's thoughts, feelings, experiences and knowledge are interconnected through associations (Kostova & Radoynovska; 2010).

With this method, the word association test was used to determine the students' associations of the given concepts and the misconceptions that exist in the individual and the cognitive structures of the individuals towards the concepts (Tokcan, 2015, p. 144).

According to İstifçi (2010, p. 360), the term association is the state of making a connection to a certain idea, entity or phenomenon that exists in the human mind, and the shortest way to reveal associations is the free association test. Word association tests provide clues about the associations of these concepts, their level and the

relationships between words.

Word association tests are one of the most widely used methods for determining associations between concepts. In addition to purposes such as diagnosis, diagnosis, measurement and evaluation, word association tests can also be used in different disciplines such as science and mathematics (Ercan, Ercan & Taşdere, 2010; Deveci, Köse & Bayır, 2014; İstifci, 2010).

It has been stated in various studies that the most appropriate time interval for word association tests is 30 seconds (Karaca & Yalçınkaya, 2019; Polat, 2013, p. 104). In this study, students were given 6 key concepts and given 30 seconds for each concept. On the first page, the implementation instructions are given on the second page. Each key concept was written 10 times in a row and distributed to the students and 30 seconds were given for each concept (Bahar, 1999, p. 46; Tokcan, 2015, p. 144). Then, with the teacher's guidance, the students moved on to the next concept and the process continued in this way. For the application of the word association test, students were asked to produce ten words that the concept evoked in their minds for each key concept in order and differently. The aim here is to minimize the risk of chain response. Because if the student does not turn to the key concept again, he/she makes associations according to the word he/she responds to, that is, the word he/she produces, which harms the purpose of the test (Açıkgöz, 2019; Bahar & Özatlı, 2003; Demirer, Ören & F. Ş., 2020; Özdemir, 2016; Tokcan, 2015).

Participants of the Study

The participants of the study were 60 7th grade students studying at Nazmiye Demirel Secondary School in Isparta city center in the 2022-2023 academic year. The reason for choosing 7th grade students in the study is that they have learned 6th grade concepts. The word association test, which was planned to be applied to 65 students, could be applied to 60 students due to the absenteeism of 3 of the students and the unacceptable answers of 2 students.

Data Collection Tool

In the study, a word association test was used as a data collection tool to determine students' cognitive structures and misconceptions. Word association tests are a practical and time-saving method (Bahar, Nartgün, Durmuş & Bıçak, 2006; Clark, 1970, p. 286; Yavuz, 2019, p.14). Word association tests are also a well-known and frequently used method with a wide range of applications (Bahar, Johnstone & Sutcliffe, 1999). In this study, 6 key concepts belonging to Unit 4 (Science and Technology in Our Lives) of the 6th grade Social Studies textbook were included. These 6 key words were chosen because there was no previous study in the literature, to determine the misconceptions of these words and to obtain information about what these concepts evoke in the minds of students. The concepts are given below with their explanations:

*Barcode***:** A system used in all areas of the industry, represented as a black and white line of different thickness, containing detailed information about the product, used to distinguish products from one another, and enabling

the transmission of product characteristics to other media by scanning the product information with some devices without any inaccuracy (MONE, 2019; Peker & Caner, 2006, p. 39).

Patent: It is a document registered by the patent office to prove who legally owns an invention and given to the owner for 20 years. With the patent, it is aimed to protect the right to use the invention by preventing the product from being made and used by another person or organization (MONE, 2019, p. 152).

Copyright: The right to own, use and reproduce a product of knowledge or ideas is called copyright. In this way, unauthorized use and reproduction are prevented and kept under control. Law No. 5846 "Law on Intellectual and Artistic Works" serves the purpose of copyright (MONE, 2019, p. 152).

Banderole: It is a kind of label on most of the products sold, such as electronic goods, food products, books, etc., which cannot be restored to its original shape when damaged, and which shows that taxes are levied by the state and that the products meet the necessary conditions for sale and use (MONE, 2019, p. 151).

Piracy: Products (books, movies, DVDs, etc.) that are sold and reproduced in violation of the law, without banderoles, without control, without permission are called pirated. Since it is unauthorized, taxes are evaded and copyright and patent rights are violated. This situation causes losses to the national economy and the owner of the original product (MONE, 2019, p. 140).

R&D: R&D is the planned activities carried out to improve the existing knowledge and to make new productions by utilizing the existing knowledge. In this way, the accumulation of knowledge constantly renews itself and progress is achieved in social and economic development (MONE, 2019, p. 140).

Data Analysis

After the word association test was applied to the students, the words obtained based on the concepts were analyzed in detail. Words that were unrelated to the given keywords and words written repeatedly were not included in this evaluation (Akman & Kocoglu, 2016; Kostova & Radoynovska, 2010).

It is assumed that the sequential answers that a student gives to a keyword from long-term memory show the relationship and semantic distance between concepts in the cognitive structure that exists in the individual's mind. The greater this semantic proximity between two concepts, the greater the relationship between concepts and the faster the recall of the concept (Karaca & Yalçınkaya, 2019). If the student's connotation of one keyword is given as an answer for another keyword, it can be said that the student has established a relationship between these words; on the contrary, it can be said that the student is unrelated (Clark, 1970, pp. 271-279; Bahar, Johnstone & Sutcliffe, 1999).

Then a frequency table showing the frequency of repetition of these words was prepared. Based on the frequency table, cut-off points were determined and concept networks were created. Breakpoints show how often the words are repeated in a certain range. In the concept networks, words derived from the key concept were also included and the concepts were associated with each other through common associations. In this way, both the existing relationship was revealed and the existing misconceptions were identified.

In this research, which aims to determine students' cognitive structures and misconceptions, word association test was used. Word association tests are one of the various methods used to identify misconceptions (Çelikkaya & Şarlayan, 2019, p. 1; Yılmaz & Çiviler, 2012, p. 3). Word association was first proposed by Gal-Ton. Then, Carl Gustav Jung developed word association tests to use individuals' associations between concepts in research. According to Jung, people's thoughts, feelings, experiences and knowledge are interconnected through associations (Kostova & Radoynovska; 2010).

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Results

The findings of the study are presented in tables and figures. Table 1 shows the frequency of the concepts in which the students' associations of the keywords barcode, banderole, copyright, piracy, patent and R&S are specified.

Table 1. Frequency of the words identified for the key concepts

	Words	Barcode	R&D	Piracy	Patent	Copyright	Banderole
1	Advertisement					11	
2	Artist				10	5	
3	Ban					4	
4	Bandit			11			
5	Barcode	5					
6	Black And White Line	10					12
7	Book	7		10			12
8	Brand				4		
9	Captain			3			
10	Code	9	9				
11	Copyright				5		3
12	Counterfeiting			8			
13	Development		15				
14	Discovery		7		6		
15	Experiment		7				
16	Forbidden Broadcast			23			
17	Fugitive			24		8	6
18	Game			5			
19	Illegal			15		12	
20	Internet		10	6			
21	Invention		10		13		
22	Inventor					3	
23	Jurisprudence					9	9
24	Label	6					4
25	Labor					3	
26	Market	23					
27	Money	4		4	3	7	6
28	Movie			25		14	
29	Music					7	
30	Number	10					3
31	Online	3					
32	Ownership				24	20	
33	Pirate						5
34	Pirates Of The Caribbean			27			
35	Price	9					
36	Product	30	11	14	16	9	20
37	Production	7	12		9		
38	Project		6				

39	QR Code		15				
40	Receipt		4				4
41	Research			20			
42	Right				24	28	
43	Scan		15				
44	School		6	12			7
45	Science			22			
46	Scientist			26	6		
47	Seafarer			28			
48	Shopping		24				10
49	Social Media					11	
50	Social Studies		3	3	3	3	4
51	Song					13	
52	Square						11
53	Stolen					8	
54	Sword			8			
55	Tape		5				
56	Tax						11
57	Technology			31	7	7	11
58	Telephone			6			
59	Theft			10		5	
60	Trade		10				
61	Unauthorized					5	
62	Food And Beverage		23				
63	Law			7			
64	Publication			15			
65	YouTube					15	

According to Table 1, it was determined that a total of 228 concepts were produced for the keyword Barcode; 204 concepts for the keyword R&D; 246 concepts for the keyword piracy; 130 concepts for the keyword patent; 192 concepts for the keyword copyright; and 138 concepts for the keyword Banderole. According to Table 1, it was determined that the most frequently responded association was the concept of technology (f=31) associated with the keyword R&D.

In the concept networks given below, the concepts that are included in a certain cut-off range depending on the keywords and their relationships with other keywords are shown. In other words, the frequency of the words associated with the keywords, for example, the concept network for the words whose frequency of repetition is in the range of 20-30 and which are also associated with other key concepts is shown. In the concept network, the arrows were drawn by thinning from high to low frequency.

Breakpoints and colors set for the generated words

- The 20-30 frequency range was determined as the first cut-off point and shown with an orange arrow in the concept network.
- The 15-19 frequency range was determined as the second cut-off point and shown with a green arrow in the concept network.
- The third cut-off point was determined as the 10-14 frequency range and shown with a burgundy arrow in the concept network.
- The fourth cut-off point was determined as the 6-9 frequency range and shown with a blue arrow in the concept network.
- The fifth cut-off point was determined as the 3-5 frequency range and shown with a black arrow in the concept network.

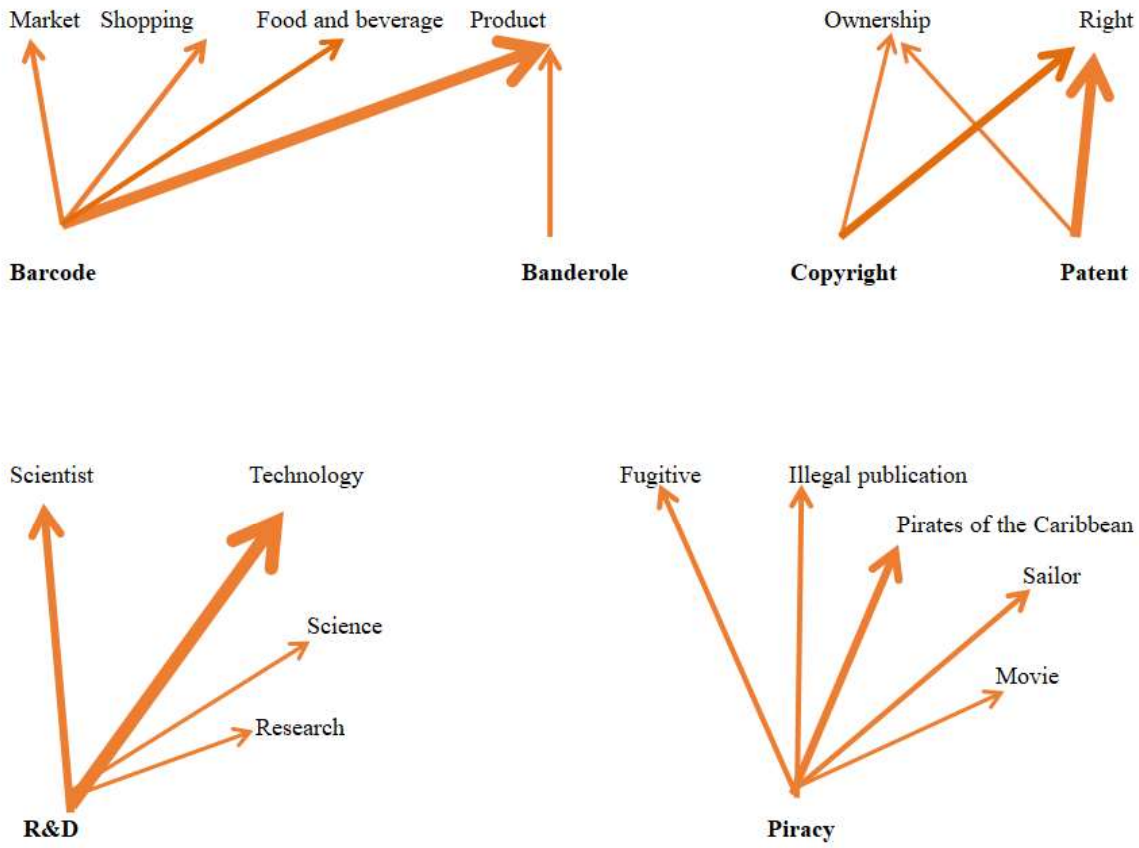

Figure1. Concept network of words with a breakpoint in the range of 20-30 words

According to the concept network given in Figure 1, it was determined that the words in the 1st cut-off range: market (f=23), shopping (f=24), product (f=30), food and beverage (f=23) associations were produced for the barcode keyword. For the keyword R&D: research (f=20), science (f=22), scientist (f=26), technology (f=31). Regarding the keyword pirate: sailor (f=28), movie (f=25), pirates of the Caribbean (f=27), fugitive (f=24),

illegal publication (f=23). Regarding the keyword patent: ownership (f=24), right (f=24) associations were produced. Regarding the keyword copyright: Right (f=28), ownership (f=20) and connotations. It was determined that product (f=20) connotations were produced for the keyword banderole.1. among the words derived in the context of the intercept interval, the word product is the concept with common connotations for barcode and banderole keywords. The words ownership and right were common associations for the keywords copyright and patent.

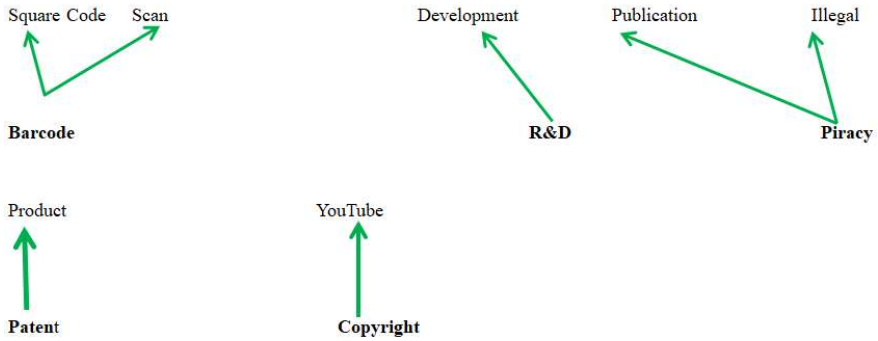

Figure 2. Concept network of words with 15-19 words at the breakpoint

According to the concept network given in Figure 2, the words derived at this cut-off point are: square code (f=15), scan (f=15) associations were produced for the keyword barcode. For the keyword R&D, only the connotation of development (f=15) was produced at this breakpoint. For the keyword piracy, the connotations of publication (f=15) and illegal (f=15) were produced. For the keyword copyright, YouTube (f=15); for the keyword patent, product (f=16) associations were produced. At the 2nd cut point, no associations were produced for the keyword banderole at the 2nd cut point. According to the concept network given in Figure 2.

Words produced based on keywords according to the concept network given in Figure 3: For the keyword barcode, it was determined that black and white line (f=10), number (f=10) and trade (f=10) associations were produced. Regarding the keyword R&D; Internet (f=10), school (f=12), production (f=12), product (f=11), invention (f=10) associations were produced. For the keyword "piracy", associations of product (f=14), book (f=10), bandit (f=11), thief (f=10) were produced.

Regarding the keyword patent, the concepts of artist (f=10) and invention (f=13) were produced. Regarding the keyword copyright: movie (f=14), social media (f=11), advertisement (f=11), song (f=13), illegal (f=12). For the keyword "banderole", connotations of book (f=12), technology (f=12), tax (f=12), square (f=11), shopping (f=10), black and white line (f=12) were produced. At the 3rd breakpoint, it was determined that the product connotation was the common derived concept in the keywords R&D and piracy. The book connotation was derived jointly for the keywords pirate and banderole. It was concluded that the black and white line connotation was the common derived concept for the keywords banderole and barcode. The concept of invention is a co-

produced connotation for the keywords patent and R&D. In the words derived from the keyword copyright, no association with any keyword related to the 3rd breakpoint was detected.

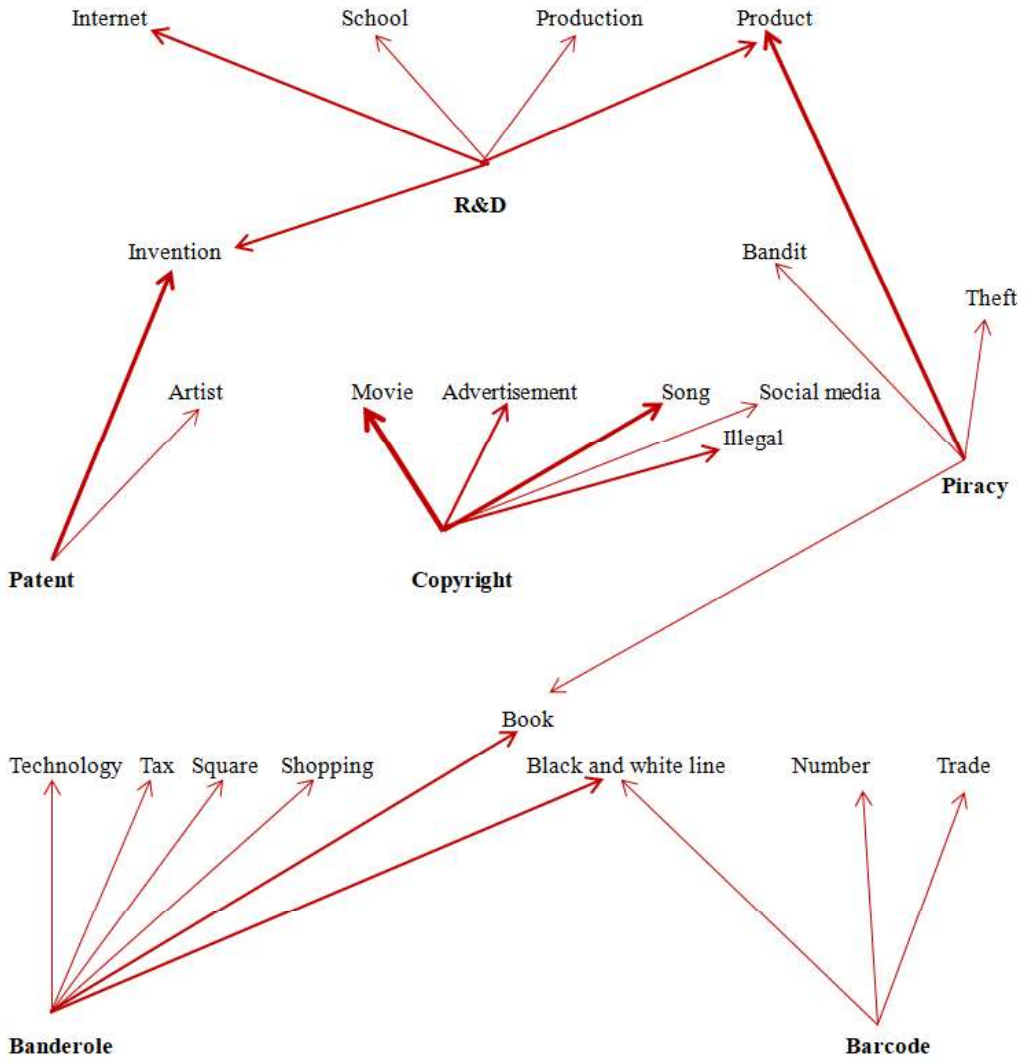

Figure 3. Concept network of words with a breakpoint of 10-14 words

According to the concept network given in Figure 4, the words determined depending on the keywords: for the keyword barcode; label (f=6), price (f=9), book (f=7), code (f=9), school (f=6), production (f=7) associations were produced. Regarding the keyword R&D: discovery (f=7), experiment (f=7), code (f=9), project (f=6), telephone (f=6). Production connotation is the common concept for the keywords barcode and patent. Associations produced for the keyword piracy: Internet (f=6), sword (f=8), counterfeiting (f=8), law (f=7). For the keyword patent: scientist (f=6), discovery (f=6), technology (f=7), production (f=9). Regarding the keyword copyright: stolen (f=8), Jurisprudence (f=9), fugitive (f=8), music (f=7), money (f=7), technology (f=7), product (f=9). For the keyword banderole: Jurisprudence (f=9), fugitive (f=6), school (f=7), money (f=6).

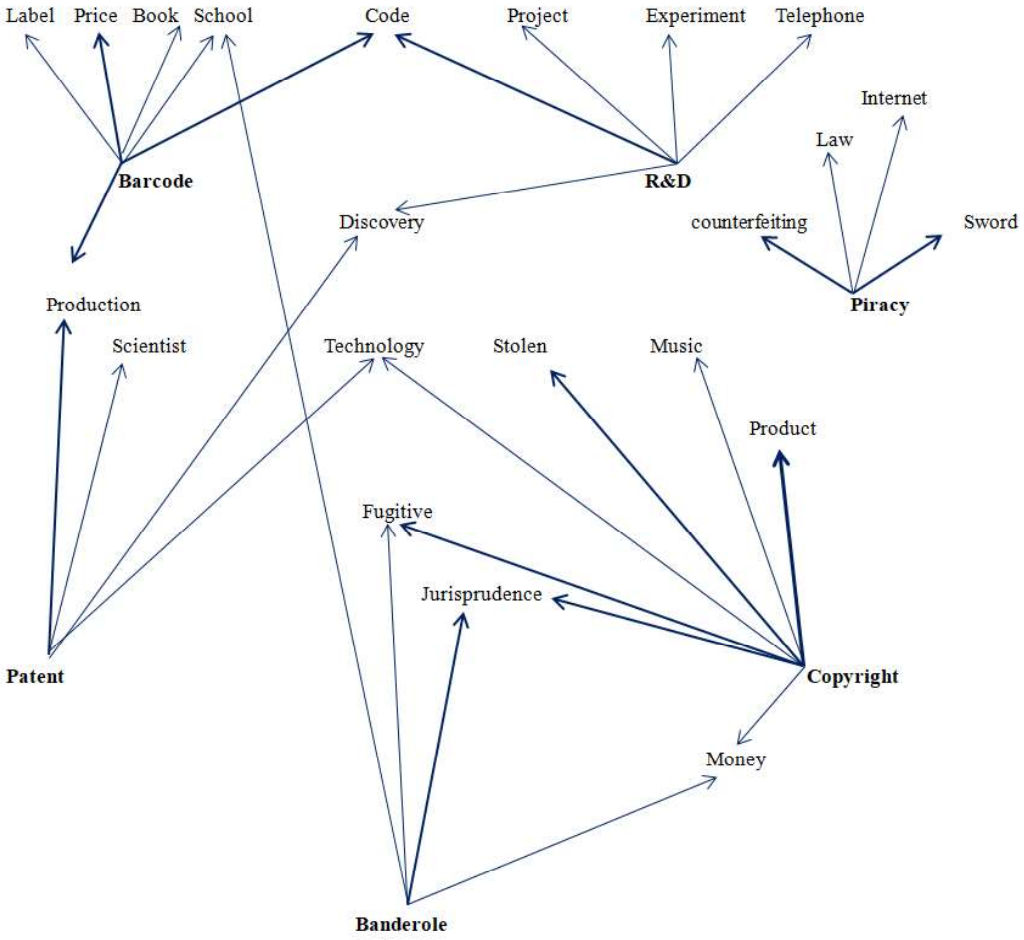

Figure 4. Concept network of words with breakpoint between 6-9 words

It was determined that the connotations of money, law, and illegal were co-produced for the keywords banderole and copyright. The connotation of technology was co-produced for the keywords patent and copyright. Code connotation was co-produced for barcode and R&D keywords. The relationship between the concepts associated with the keyword piracy and the keywords given in this interval could not be determined.

The derived words belonging to the breakpoint given in Figure 5 are as follows: the associations related to the keyword barcode were determined to be the concepts of tape (f=5), barcode (f=5), receipt (f=4), online (f=3), money (f=4), social studies (f=3). Associations related to the keyword piracy were determined as the concepts of captain (f=3), game (f=5), money (f=4), social studies (f=3). Associations related to the keyword patent were determined to be the concepts of brand (f=4), money (f=3), social studies (f=3), copyright (f=5). The connotations related to the keyword copyright were determined to be the concepts of unauthorized (f=5), ban (f=4), social studies (f=3), thief (f=5) inventor (f=3), artist (f=5), labor (f=3). It was determined that the associations related to the keyword banderole were label (f=4), receipt (f=4), copyright (=3), social studies (f=4), number (f=3), piracy (f=5).

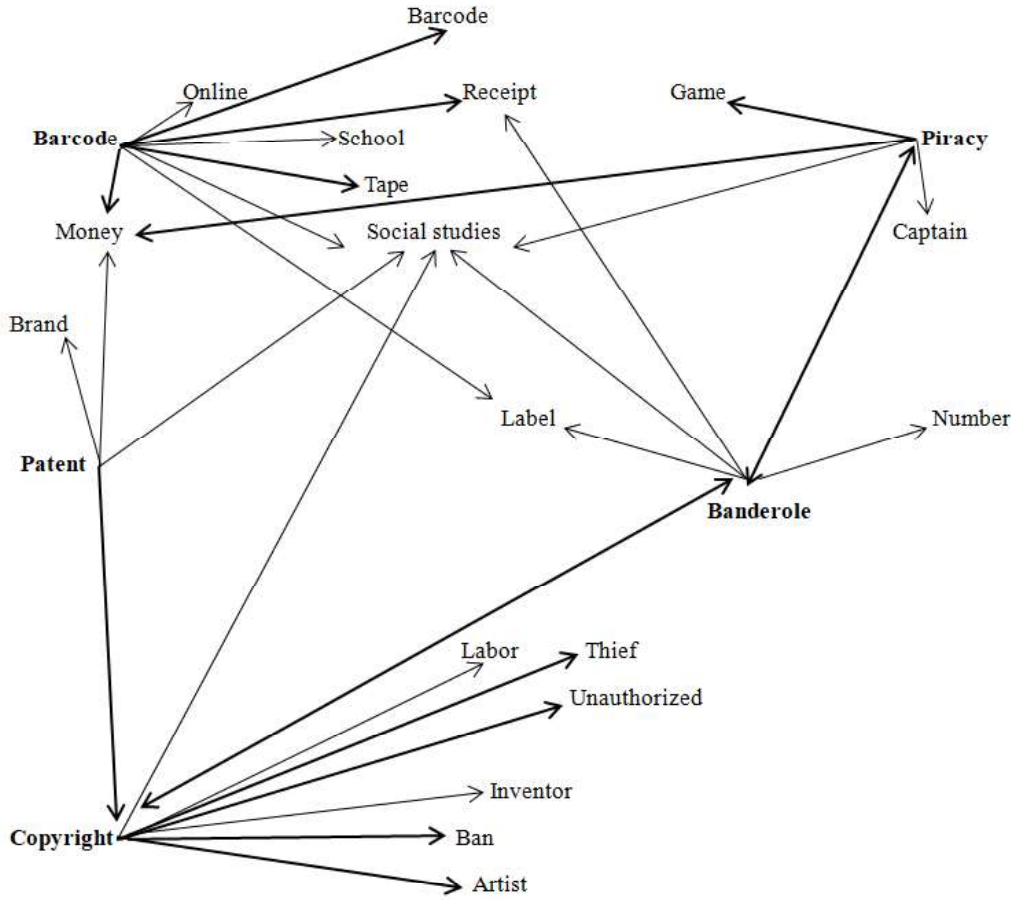

Figure 5. Concept network of words with breakpoint between 3-5 words

At the 5th cut-off point, it is seen that the frequency values decreased, but the words diversified and at the same time the relationships between concepts increased. Except for the keyword R&D, the association of social studies was the concept with which common associations and relationships were established in all other keywords. At the 5th breakpoint, the connotation of label and social studies was the common derived concept for the keywords barcode and banderole, while the connotation of money was the common derived concept for the keywords patent and piracy. It was determined that patent was associated with copyright and learning deficit and misconception were identified. It was determined that banderole was associated with copyright and misconception was determined with learning deficit. It was determined that a direct relationship was established between the keyword banderole and the keywords copyright and piracy. For the R&D keyword, no concept was identified at the 5th breakpoint.

Red arrows were used for barcode keyword, blue arrows for R&D keyword, purple arrows for piracy keyword, green arrows for patent keyword, orange arrows for copyright keyword, and black arrows for banderole

keyword. In the created concept network, arrows were drawn by thinning from high to low frequency.

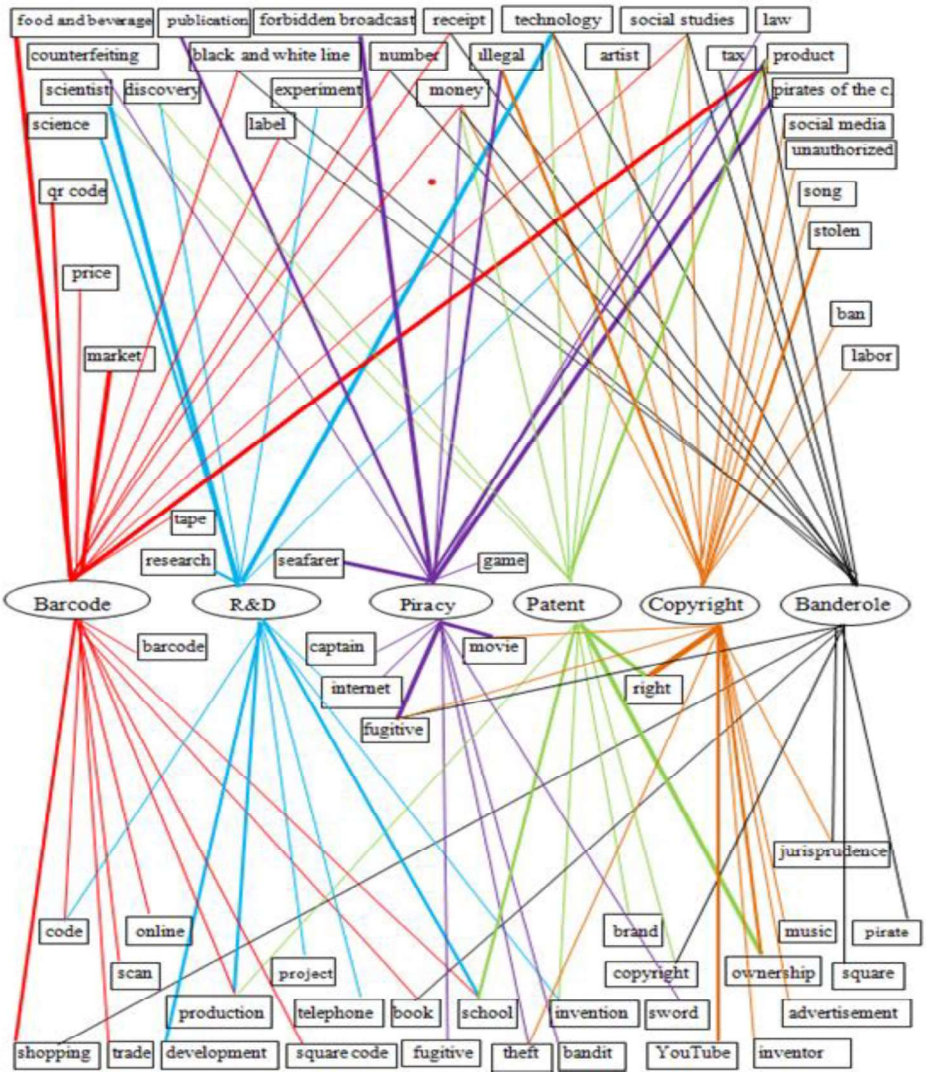

Figure 6. Concept network of associations for the concepts of barcode, banderole, R&D, copyright, piracy, patent

A total of 228 words were produced for the barcode keyword. The word that the students repeated most frequently was the connotation of product (f=30) in the barcode keyword. Then, shopping (f=24), market (f=23), food and beverage (f=23) were the concepts with high frequency. The number of words generated for the keyword R&D was 199 in total and the most frequently associated concept was technology (f=31). Following this concept, the most frequently repeated concepts were scientist (f=26), science (f=22) and research (f=20). It was determined that a total of 246 concepts were produced for the keyword pirate and the most frequently associated concepts were sailor (f=28) and pirates of the Caribbean (f=27), movie (f=25), smuggler (F=24), forbidden publication (f=23). According to Table 1, it was determined that a total of 130 words were produced

for the keyword patent and the most frequently associated concepts were the words ownership (f=24) and right (f=24). This is followed by the words product (f=16) and invention (f=13). According to Table 1, a total of 233 words were produced for the keyword copyright, and the most frequently associated concept of right (f=28) was followed by ownership (f=20), YouTube (f=15) and movie (f=14). It was determined that a total of 152 words were produced for the keyword banderole and the most frequently associated concept was product (f=20). The concept of product was followed by black and white line (f=12) and book associations (f=12).

Conclusion and Discussion

According to the results of the research, when the frequency of association of the concepts in the minds of the students was analyzed, it was determined that the most word production was the key concept of pirate. In addition, it was determined that the most misconceptions existed in the words associated with this keyword. It was concluded that the abundance of word associations did not indicate that the concept was learned as it should be. It is assumed that the fact that the word pirate has an abstract meaning in the social studies course and that its use in the concrete sense is popular in daily life and that the lack of sufficient, correct and permanent learning in the social studies course in the abstract sense increases the misconceptions.

As a result of the research, it was determined that the keyword with the least number of words produced and associations made was the concept of patent. It was concluded that students have both misconceptions and learning deficiencies regarding the concept of patent.

It was seen that the concepts with a cut-off range of 3-5 had the most inter conceptual relationships. It was concluded that the concepts with a cut-off point in the range of 20-30 were not related to each other. The key concept with the least misconceptions was determined as R&D. It is seen that the students associated the given keywords with the social studies course, albeit at low frequency values. As a result of the research, it was found that the students had some ideas about the keywords, albeit insufficient, and that they generally used the concepts of barcode and banderole interchangeably with the concepts of copyright and patent, and that they could not adequately construct the abstract concept of piracy in their minds and that they experienced misconceptions.

When the studies were examined, word association tests were mostly used in the field of science course (Akman & Koçoğlu, 2016). When the literature is examined within the scope of social studies course, various word association test studies applied to pre-service teachers and students come across. These studies are as follows. grade students' cognitive structures on Atatürk's Principles with word association test (Akman & Koçoğlu; 2016), Pre-service teachers' cognitive structures related to the concepts of social sciences and social studies: A word association test application (Bayır, Deveci & Köse, 2014); Analysis of pre-service social studies teachers' perceptions of natural disaster concepts through word association test (Karakuş, 2019); Determination of pre-service social studies teachers' perceptions about the first Turkish states through word association test (WAT)

(Balcı, 2019), Analysis of pre-service social studies teachers' cognitive structures about Ottoman and conquest concepts through word association test (Demirkaya, Köç & Ünal, 2020), Analysis of secondary school 8th grade students' cognitive structures about landforms. grade students' perceptions of landforms through a word association test (WAT) (Özkaral & Yiğit, 2021), Seventh grade students' perceptions of various occupational groups through a word association test (WAT) (Karaca & Yalçınkaya, 2019), Examining the Cognitive Structures and Conceptual Development Processes of Students with the Social Studies Course "The Adventure of Democracy" Unit (Çelikkaya & Kürümlüoğlu, 2019), Determining the cognitive structures of prospective social studies teachers about Atatürk's Principles through word association test (Er Tuna, 2018), Examining the cognitive structures of 5th grade students about the social studies course (Bozdoğan, 2022), Examining the conceptual development process of students in the social studies course "Let's Know Our Region" unit (Öztürk & Özcan, 2017). Grade students' cognitive structures related to the social studies course (Bozdoğan, 2022), Examining the Cognitive Structures of Gifted Secondary School Students Related to the Concept of Social Studies through Word Association Test (Acar & Arslan, 2022).

In this study, with the word association test, it was aimed to reach the relationships between concepts, associations created by the concepts in students, cognitive perspective and existing learning deficiencies and misconceptions about six concepts within the learning area of science, technology and society. It was concluded that students had deficiencies in making associations about the concepts due to the abstract meaning of the concepts, mislearning and incomplete learning due to the environment or school. Social studies teachers should give the necessary importance to concept teaching in the social studies course, which contains a lot of concepts in order to achieve the objectives of the course, and different concept teaching methods and techniques should be employed (Bozdoğan, 2022).

References

Açıkgöz, F. N. (2019). *Beşinci sınıf öğrencilerinin yıkıcı doğa olaylarına ilişkin algılarının kelime ilişkilendirme testi (KİT) kullanılarak incelenmesi* (Master's thesis, Niğde Ömer Halisdemir Üniversitesi, Eğitim Bilimleri Enstitüsü).

Akcay, B., Adiguzel, S., Tiryaki, A., & Yavuz, R. (2023). The Effect of Brain-Based Learning on Students' Metacognitive Awareness. *International Journal on Social and Education Sciences (IJonSES), 5*(3), 676-699. https://doi.org/10.46328/ijonses.608

Akman, Ö., & Koçoglu, E. (2016). Investigation 8th grade students secondary school cognitive structure about principles of Ataturk through word association test. *Journal of education and Training Studies*, *4*(11), 151-162.

Akpınar, M., & Kaymakçı, S. (2012). Ülkemizde sosyal bilgiler öğretiminin genel amaçlarına karşılaştırmalı bir bakış. *Kastamonu Eğitim Dergisi*, *20*(2), 605-626.

Antonio, R. P. & Prudente, M. S. (2022). Effectiveness of Metacognitive Instruction on Students' Science Learning Achievement: A Meta-Analysis. *International Journal on Studies in Education (IJonSE),*

4(1), 43-54. https://doi.org/10.46328/ijonse.50

Aslan, E., Safran, M., Ata, B., Karatekin, K., v.d. (2016). *Geçmişten Günümüze Sosyal Bilgiler*. Ed. Dilek, D. Pegem Atıf İndeksi, 01-52.

Bahar, M., Johnstone, A.H. & Sutcliffe, R.G (1999). Investıgatıon of bıology students' cognıtıve structure through word assocıatıon tests, mınd maps and structural communıcatıon grıds. Glasgow Üniversitesi (Birleşik Krallık).

Bahar, M., Nartgün, Z., Durmuş, S., & Bıçak, B. (2006). Alternatif ölçme ve değerlendirme. *Geleneksel-alternatif ölçme ve değerlendirme öğretmen el kitabı.* Ankara: Pegem A Yayınları, 49-142.

Balcı, M. (2019). *Sosyal bilgiler öğretmen adaylarının ilk Türk devletleri hakkındaki algılarının kelime ilişkilendirme testi (kit) aracılığıyla belirlenmesi* (Master's thesis, Niğde Üniversitesi/Eğitim Bilimleri Enstitüsü).

Bertiz, Y. & Kocaman Karoğlu, A. (2020). Distance Education Students' Cognitive Flexibility Levels and Distance Education Motivations *International Journal of Research in Education and Science (IJRES), 6*(4), 638-648.

Borazan, İ. (2008). *" Kavram yanılgısı ve çoklu zeka alanlarının ilişkilendirilmesine dayalı bir öğretimin kavram yanılgılarının giderilmesindeki etkisinin incelenmesi:" Dolaşım sistemi" örneği* (Yüksek lisans tezi, Balıkesir Üniversitesi, Fen Bilimleri Enstitüsü).

Bozdoğan, K. (2022) 5. Sınıf öğrencilerinin sosyal bilgiler dersine ilişkin bilişsel yapılarının incelenmesi. *Türkiye Bilimsel Araştırmalar Dergisi*, *7*(1), 37-54.

Braisby, N. (1999). When are concepts one or many?. *Trends in Cognitive Sciences*, *3*(9), 321.

Cakir, E., Ozturk, M.S., Unal, M. (2019). Interpainting as a Creating Method in Digital Illustration: Reinterpretations from Movie Scenes. *Science, Education, Art and Technology Journal (SEAT Journal), 3*(2), 78-88.

Carey, S. (2009). Where our number concepts come from. *The Journal of philosophy*, *106*(4), 220-254.

Clark, H. H. (1970). Word associations and linguistic theory. *New horizons in linguistics*, *1*, 271-286.

Çakmak, F. (2006). *İlköğretim 6. sınıf öğrencilerinin sosyal bilgiler dersi nüfus ve yerleşme konusunda geçen kavramları anlama düzeyleri ve kavram yanılgıları* (Master's thesis, Afyon Kocatepe Üniversitesi, Sosyal Bilimler Enstitüsü).

Çatak, M. (2020). *Sosyal Bilgiler ve Sınıf Öğretmenleri için Sosyal Bilgiler Öğretimi, (1-24)*. Ed. Şimşek, S. 2. Baskı. Ankara: Anı Yayıncılık.

Çaycı, B., Demir, M. K., Başaran, M., & Demir, M. (2007).Sosyal bilgiler dersinde işbirliğine dayalı öğrenme ile kavram öğretimi. *Kastamonu Eğitim Dergisi*, *15*(2), 619-630.

Çelikkaya, T. (2019). I. Sosyal bilgiler Programı tarihi ve güncel gelişmeler. *Sosyal Bilgiler Öğretimi.* 1-47.

Çelikkaya, T., & Kürümlüoğlu, M. (2019). Sosyal bilgiler dersi "demokrasinin serüveni" ünitesi ile öğrencilerin

Çelikkaya, T., & Şarlayan, R. (2019). Kavramsal değişim metinlerinin sosyal bilgiler dersindeki kavram yanılgılarının giderilmesine etkisi. *Kastamonu Eğitim Dergisi*, *27*(6), 2403-2412.

Çetin, K. (2003). Türk eğitim tarihinde sosyal bilimler ve sosyal bilgilerin tarihsel süreci. *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *2*(1-2).

Demirer, T., & Ören, F. Ş. (2020). 7. ve 8. sınıf öğrencilerinin çevresel vatandaşlık ve ekolojik ayak izi

kavramlarına ilişkin düşünceleri: Kelime ilişkilendirme örneği. *Van Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, *17*(1), 603-642.

Demirkaya, H., & Karacan, H. (2016). Ortaokul 6. sınıf öğrencilerinin sosyal bilgiler dersindeki bazı coğrafi kavramları anlama düzeyleri ve kavram yanılgıları. *Uluslararası Alan Eğitimi Dergisi*, *2*(2), 38-57.

Demirkaya, H., Köç, A., & Ünal, O. Sosyal bilgiler öğretmen adaylarının Osmanlı ve fetih kavramlarına ilişkin bilişsel yapılarının kelime ilişkilendirme testi yoluyla analizi. *Ondokuz Mayis University Journal of Education Faculty*, *39*(2), 45-63.

Dergisi, A. (2010). Playing with words: A study on word association responses. *The Journal of International Social Research, 10 (3), 364*, *365*.

Deveci, H., Köse, T. Ç., & Bayır, Ö. G. (2014). Öğretmen adaylarının sosyal bilimler ve sosyal bilgiler kavramlarına ilişkin bilişsel yapıları: kelime ilişkilendirme testi uygulaması. *Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (16), 101-124.

Doğanay, A. (2008). Çağdaş sosyal bilgiler anlayışı ışığında yeni sosyal bilgiler programının değerlendirilmesi*. Çukurova üniversitesi sosyal bilimler enstitüsü dergisi, 17(2), 77-96*.

Ercan, F., Taşdere, A., & Ercan, N. (2010). Kelime ilişkilendirme testi aracılığıyla bilişsel yapının ve kavramsal değişimin gözlenmesi. *Journal of Turkish Science Education*.

Erdener, E. (2009). Vygotsky'nin düşünce ve dil gelişimi üzerine görüşleri: Piaget'e eleştirel bir bakış. *Türk Eğitim Bilimleri Dergisi*, *7*(1), 85-103.

Er-Tuna, Y. (2018). Tarih ve sosyal bilgiler öğretmen adaylarının Atatürk ilkelerine ilişkin bilişsel yapılarının kelime ilişkilendirme testi aracılığı ile belirlenmesi. *Turkish History Education Journal*, *7*(1), 43-68.

Eyidoğan, F., & Güneysu, S. (2003). İlköğretim 8. sınıf fen bilgisi kitaplarındaki kavram yanılgılarının incelenmesi.

Fancett, V. S., Johns, E., Hickman, V.L., Price, R. A. (1968). Science Concepts and the Classroom.

Hwang Y. S., Vrongistinos, K., Kim, J., & Min, A. E. (2021). Kindergarten children's metacognitive self-regulated learning during and after watching other child's problem-solving behaviors. In V. Akerson & M. Shelley (Eds.), *Proceedings of IConSES 2021-- International Conference on Social and Education Sciences* (pp. 178-183), Chicago, USA. ISTES Organization.

İnan, S., (2019). *Sosyal Bilgiler Eğitimine Giriş*. Edt. Demircioğlu, İ. H., Kaymakçı, S., Demircioğlu, H. 1-23. 3. Baskı. Ankara: Anı Yayıncılık.

İstifçi, İ. (2010). Playıng Wıth Words: A Study On Word Associatıon Responses. *Journal of International Social Research*, *3*(10).

Joubish, M. F., & Khurram, M. A. (2011). Outlook on some concepts in the curriculum of social studies. *World Applied Sciences Journal*, *12*(9), 1374-1377.

Kalaycı, N., & Baysal, S. B. (2020). Sosyal bilgiler öğretim programlarının karşılaştırmalı analizi (2005-2017-2018). *Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi*, *22*(1), 106-129.

Karaca, A., & Yalçınkaya, E. (2019). Yedinci sınıf öğrencilerinin çeşitli meslek grupları hakkındaki algılarının kelime ilişkilendirme testi (Kit) aracılığıyla incelenmesi. *Atatürk Üniversitesi Kazım Karabekir Eğitim Fakültesi Dergisi*, (39), 1-21.

Karakuş, U. (2019). Sosyal bilgiler öğretmen adaylarının doğal afet kavramlarına ilişkin algılarının kelime

ilişkilendirme testi aracılığıyla incelenmesi. *Cumhuriyet Uluslararası Eğitim Dergisi*, *8*(3), 735-751.

Keskin, Y. (2019). Sosyal bilgiler programı tarihi ve güncel gelişmeler. *Yeni program ve ders içeriklerine göre sosyal bilgiler öğretimi I*. Edt. Çelikkaya, T., Demirbaş, Ö. Ç., Yıldırım, T., Yakar, H. 1-41.

Kim, J. Y. & Anderson, T. N. (2023). The Efficacy of Metacognitive Reading Strategies in the College Classroom: Student Perception towards the Learning Experience. *International Journal on Studies in Education (IJonSE), 5*(1), 1-14. https://doi.org/10.46328/ijonse.80

Klausmeier, H. J. (1992). Concept learning and concept teaching. *Educational psychologist*, *27*(3), 267-286.

Kostova, Z., & Radoynovska, B. (2010). Motıvatıng students'learnıng usıng word assocıatıon test and concept maps. *Bulgarian Journal of Science & Education Policy*, *4*(1).

Koyuncu, B. (2015). *Cumhuriyetten günümüze sosyal bilgiler programlarının incelenmesi* (Master's thesis, Sosyal Bilimler Enstitüsü).

Maddah, H. A. (2021). Educational leadership for development of structural plans, cultural diversity, curriculum standards, and faculty engagement. In S. Jackowicz & I. Sahin (Eds.), *Proceedings of IHSES 2021--International Conference on Humanities, Social and Education Sciences* (pp. 151-163), New York, USA. ISTES Organization.

Malatyalı, E., & Yılmaz, K. (2010). Yapılandırmacı öğrenme sürecinde kavramlar ve önemi: Kavramların pedagojik açıdan incelenmesi. *Uluslararası Sosyal Araştırmalar Dergisi*, *3*(14), 320-332.

Matsumoto, K. (2017). A review of Jerome Bruner's educational theory. *Nagoya Gakuin Üniversitesi Dergisi; Sosyal Bilimler*, *54*(1), 129-146.

MONE (2005). *İlköğretim sosyal bilgiler dersi öğretim programı ve kılavuzu*. Ankara: Milli Eğitim Yayınları.

MONE (2018). *TC Milli Eğitim Bakanlığı Sosyal Bilgiler Dersi Öğretim Programı (İlkokul ve Ortaokul 4, 5, 6 ve 7. Sınıflar)*. Ankara.

Novak, J. D. (1987). Misconceptions and educational strategies in science and mathematics. proceedings of the international seminar (2nd, Ithaca, New York, July 26-29, 1987). Volume III.

Ozturk, O.T. (2023). Examination of 21st Century Skills and Technological Competences of Students of Fine Arts Faculty. *International Journal of Education in Mathematics, Science, and Technology (IJEMST), 11*(1), 115-132. https://doi.org/10.46328/ijemst.2931

Ozturk, M.S., Kinik, M., & Ozturk, M.U. (2023). Investigation of Technological Pedagogical and Content Knowledge (TPACK) Competencies of University Students. *International Journal of Technology in Education (IJTE), 6*(3), 418-433. https://doi.org/10.46328/ijte.524

Ozturk, M.S. & Susuz, M. (2023). The Investigation of Creativity Levels of Fine Arts Faculty Students. *International Journal on Social and Education Sciences (IJonSES), 5*(4), 929-944. https://doi.org/10.46328/ijonses.596

Özkaral, T. C., & Bozyiğit, R. (2021). Ortaokul 8. sınıf öğrencilerinin yeryüzü şekillerine yönelik algılarının kelime ilişkilendirme testi (kit) aracılığıyla incelenmesi. *Avrasya Sosyal Ve Ekonomi Araştırmaları Dergisi*, *8*(2), 51-63.

Öztürk, T., & Özcan, N. Y. (2017). Sosyal bilgiler dersi "Bölgemizi Tanıyalım" ünitesinde öğrencilerin kavramsal gelişim sürecinin incelenmesi. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, *42*(42), 109-123.

Peifer, J. S., & Taasoobshirazi, G. (2022). Heightened Cognitive Empathy through Ethnic Identity and Intercultural Competence for Individuals with Historically Marginalized Identities. *International Journal on Social and Education Sciences (IJonSES), 4*(2), 290-306. https://doi.org/10.46328/ijonses.324

Peker, Y., & Caner, C. (2006). Gıdaların etiketlenmesi ve çizgi kod sistemi barkod. *akademik gıda*, *4*(3), 37-41.

Polat, G. (2013). 9. sınıf öğrencilerinin çevreye ilişkin bilişsel yapılarının kelime ilişkilendirme test tekniği ile tespiti. *Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi*, *7*(1), 97-120.

Price, R. A. (1965). *Major Concepts for the Social Studies: A Progress Report.*

Richard, (1968). *Concepts Concepts Concepts.* Ed. Beyer, B. K., & Penna, A. N. 10-12.

Rogti, M. (2021). Prospects for Raising Critical Thinking Competency through Project-Based Learning in EFL Classroom. *International Journal of Studies in Education and Science (IJSES), 2*(1), 46-58.

Safran, M. (2008). Sosyal bilgiler öğretimine bakış. *Özel Öğretim Yöntemleriyle Sosyal Bilgiler Öğretimi* (1-19). Ankara: Pegem Akademi Yayınları.

Schmidith, H. J. (1997). Students' Misconceptions Looking For a Pattern. John Wiley & Sons, Inc. Science education, 123–135.

Solomon, K. O., Medin, D. L., & Lynch, E. (1999). Concepts do more than categorize. *Trends in cognitive sciences*, *3*(3), 99-105.

Sönmez, V. (2010). *Sosyal bilgiler öğretimi ve öğretmen kılavuzu.* Yenilenmiş 6. Baskı. Ankara: Anı Yayıncılık.

Sözen, M., & Bolat, M. (2014). 11–18 yaş öğrencilerin ses hızı ile ilgili sahip oldukları kavram yanılgılarının belirlenmesi. *Ondokuz Mayis University Journal of Education Faculty*, *33*(2), 505-523.

Sözer, E. (1998). Sosyal bilgiler öğretiminde ilke, strateji, yöntem ve teknikler. *Sosyal bilgiler öğretimi*, 75-86.

Tabachnick, B. R. (1970). Selection and Analysis of Social Studies Concepts for Inclusion in Tests of Concept Attainment..

Tay, B. (2018). Sosyal Bilgiler Öğretiminin Dünü, Bugünü ve Yarını. *Sosyal Bilgilerin Temelleri,* 1-18. Ed. R. Turan, K. Ulusoy. 5. Baskı. Ankara: Pegem Akademi.

Tokcan, H. (2015). *Sosyal Bilgilerde Kavram öğretimi.* 1. Baskı, Ankara : Pegem.

Yalçin, A., & Akhan, N. E. (2019). Cumhuriyetten günümüze sosyal bilgiler programlarının sosyal bilgiler öğretim yaklaşımlarına göre incelenmesi. *Journal of Theoretical Educational Science*, *12*(3), 842-873.

Yavuz, T. (2019). *Lise öğrencilerinin" biyoloji' 'bilimine yönelik algılarının çizim ve serbest kelime çağrışım vasıtasıyla incelenmesi* (Master's thesis, Necmettin Erbakan Üniversitesi Eğitim Bilimleri Enstitüsü).

Yazıcı, H. & Samancı, O. (2003). İlköğretim Öğrencilerinin Sosyal Bilgiler Ders Konuları İle İlgili Bazı Kavramları Anlama Düzeyleri, *Milli Eğitim Dergisi*, 158.

Yılmaz, K., & Çiviler, M. (2012). İlköğretim 6. sınıf sosyal bilgiler dersi "yeryüzünde yaşam" ünitesinde yer alan tarih kavramlarının öğretiminde karşılaşılan kavram yanılgıları üzerine bir eylem araştırması. *Turkish History Education Journal*, *1*(1), 1-31.