

## **Determination of Cognitive Structures in Concepts Related to Writing Education With the Word Association Test**

**Esra Nur TIRYAKI<sup>1</sup>**

Hatay Mustafa Kemal University

### **Abstract**

This research was conducted as a case study, which is one of the qualitative research methods, to determine how prospective Turkish teachers explain the concepts in their minds about writing skills. The study group consists of 60 3rd-grade prospective teachers studying at the Department of Turkish Language Education of Hatay Mustafa Kemal University in the 2018-2019 academic year. Research data were collected through a word association test. In order to reach the concepts that best describe the writing skill, first of all, ten concepts were determined by the researcher within the scope of the relevant course. Then, the test prepared with these concepts was presented to the expert opinion, and the word association test was designed with the remaining six concepts (writing, text, text types, narrative text, informative text, and argumentative text). In the data analysis, the answers of the prospective teachers to the word test were examined in detail and independently with an expert to ensure reliability. Frequency distribution was created with the frequency of repetition of the concepts related to key concepts. According to the frequency of the concepts, the breakpoint technique (Bahar, Johnstone & Sutcliffe, 1999) was used. In this study, breakpoint points between 20 concepts and above, 15-19 concepts, 10-14 concepts, and 5-9 concepts were applied. Concept networks were created separately according to the pre-test and post-test. According to the data obtained, the concept in the pre-test ( $f=1.636$ ) increased to ( $f=1.732$ ) in the last test. While the least increase was observed in the “writing” key concept ( $f=299-302$ ), the highest increase was found in the “text” concept ( $f=263-292$ ). The number of sentences containing academic information about key concepts increased from pre-test to post-test ( $f=116$ ;  $f=179$ ). The number of sentences without academic information ( $f=189-f=115$ ) decreased. Moreover, the decrease in sentences containing misconceptions ( $f=29-f=13$ ) supports this situation. When the sentences were examined in terms of including scientific information, it was found that academic expressions were used more accurately, and misconceptions were reduced.

**Keywords:** Writing education, word association test, concept.

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<sup>1</sup>Assoc. Prof. Dr., Education Faculty, Hatay Mustafa Kemal University, Hatay, Antakya, ORCID: 0000-0002-2418-7194.

**Correspondence:** etiryaki@mku.edu.tr

## Introduction

Language is a systematic structure with rules that enable a person to communicate both with himself and his environment. The teachers, who carry out language education and training, teach their students the language skills based on language rules. In this process, teachers' goal is to carry the learning process that starts with language skills to functional language use. In functional language use, the learner should be able to understand and explain correctly by being aware of the features of the language.

People have shed light on future generations through writing from past to present because it is a language skill that ensures the permanence of a nation's culture, thought, and aesthetic sense. The writing skill is the part of the language in which it is written. It is a planned and systematic transfer of one's thoughts on a subject according to language rules. "Since writing is concerned with organizing information and conveying meaning, it is a very important part of the thought development process related to long-term memory, which constitutes episodic memory that includes the visual and auditory aspects of events and experiences and semantic memory that reflects information, thoughts, behaviors, and values, and unconscious memory, which includes emotions" (White and Arndt, 1991, p.17). Hence, it is of paramount importance to know the rules in writing as well as present them to the reader as a meaningful whole. According to Dilidüzgün (2019, p.191), writing creates an environment and time for the individual to practice, test, and develop language so that he can see how much he can use the language, that is, at what level and the extent he can express his thoughts, and see his deficiencies in language. Therefore, writing education is a process that concretely demonstrates the correct use of language skills.

Writing skill in Turkish lessons is a gradual one that students develop under the guidance of the teacher. It can be regarded as the most difficult creative act (Bereiter and Scardamalia, 1996, p.20), and if it comes to 'writing to write,' it is the most difficult skill to develop and operate (Dilidüzgün, 2019, p.189). Prospective Turkish teachers learn the process of acquiring this skill according to the Turkish curriculum in the context of the writing education course.

Learning is the result of the interaction of new information and schemas from outside with concepts in mind. The concept is an information form structure representing the common characteristics of different objects and phenomena, which are meaningful in the human mind, and it is a variable expressed with one word" (Ülgen, 2001, p.100). Concepts are a structure that gives meaning to a person's cognitive structure. The variety of concepts about a subject helps create a mind map of the person about that subject. A mind map is a visualization of the relationship between key concepts related to a topic. "Mind maps are used in the field of education, organization, problem-solving, and decision-making processes, as well as creating, visualizing, designing, and classifying thoughts" (Onan, 2020, p. 240). It is difficult to reveal the cognitive structures of the person as a result

of learning (Kurt, Ekici, Aktaş, & Aksu, 2013, p.187). In this case, Gilbert, Boulter, & Rutherford (1998a), Gilbert, Boulter, & Rutherford, (1998b), and Gilbert & Boulter (2000) suggested that people's cognitive structures could be revealed with key concepts. The word association test can be used to conceptualize the knowledge that prospective teachers acquired about any subject and find out the relationships between these concepts in their minds. Accordingly, this research aims to determine the cognitive structures of prospective Turkish teachers in terms of writing education with word association tests.

## **Method**

### **Research Model**

This research was conducted as a case study, one of the qualitative research methods, to determine how prospective Turkish teachers explain the concepts in their minds about writing skills. The case analysis involves organizing data based on specific situations to make in-depth study and comparison (Patton, 2014, p.447).

### **Study Group**

The study group consists of 60 3rd-grade prospective teachers studying at the Department of Turkish Language Education at Hatay Mustafa Kemal University in the 2018-2019 academic year.

### **Data Collection Tool**

Research data were collected through word association test (WAT), which is a measurement tool that finds out whether the connection between the concepts called back from long-term memory is meaningful (Bahar, Johnstone, & Sutcliffe, 1999) and the cognitive structure of the concepts and people (Bahar & Özatlı, 2003). As one of the alternative measurement techniques, the word association test was applied in two stages in the "Writing Education" course as pre-test and post-test. In order to reach the concepts that best describe the writing skill, first of all, ten concepts were determined by the researcher within the scope of the relevant course. Then, the test prepared with these concepts was presented to the expert opinion, and the word association test was designed with the remaining six concepts (writing, text, text types, narrative text, informative text, and argumentative text). A section from the data collection tool is presented below.

**Writing:**

**Writing:**

**Writing:**

**Writing:**

**Writing:**

**Related**

**Sentence**

.....

The following steps were followed in the implementation of this test.

- During the pre-test application process, the WAT was distributed to the students with no writing education. Prospective teachers were informed about the WAT, and 30 seconds were given for each concept. During this period, the participants wrote the concepts and related sentences they had in mind, and the tests were collected.
- Then, after the Writing Education course was taught throughout the semester, the final WAT was distributed. The same process steps were applied again, and the research data were collected.

**Data Analysis**

The data were analyzed in detail and independently with an expert to ensure the reliability of the prospective teachers’ answers to the word association test. Frequency distribution was created with the frequency of repetition of the concepts related to key concepts. According to the frequency of the concepts, the breakpoint technique (Bahar, Johnstone & Sutcliffe, 1999) was used. In this study, the breakpoints between 20 concepts and above, 15-19 concepts, 10-14 concepts, and 5-9 concepts were applied. Concept networks were created separately according to the pre-test and post-test. This concept networks are visualized using the MindMapx program.

**Findings**

The pre-test and post-test word numbers given by the prospective teachers regarding key concepts are shown in Table 1. While 1,636 concepts were produced in the pre-test, this number increased to 1,732 after the writing education. While the least increase was observed in the “writing” key concept (f=299-302), the highest increase was found in the “text” concept (f=263-292).

It can be argued that an increase in all of the key concepts is an improvement in the learning of the concepts.

**Table 1.** Number of Words Associated with Key Concepts

Key Concepts	Number of Words	
	Pre-test	Post-test
Writing	299	302
Text	263	292
Text Types	275	292
Informative Text	269	281
Narrative Text	276	284

Argumentative Text	254	272
Total	1.636	1.723

According to the pre-test results of the words associated with the key concept according to the frequency table, the concept network is presented in Figure 1.

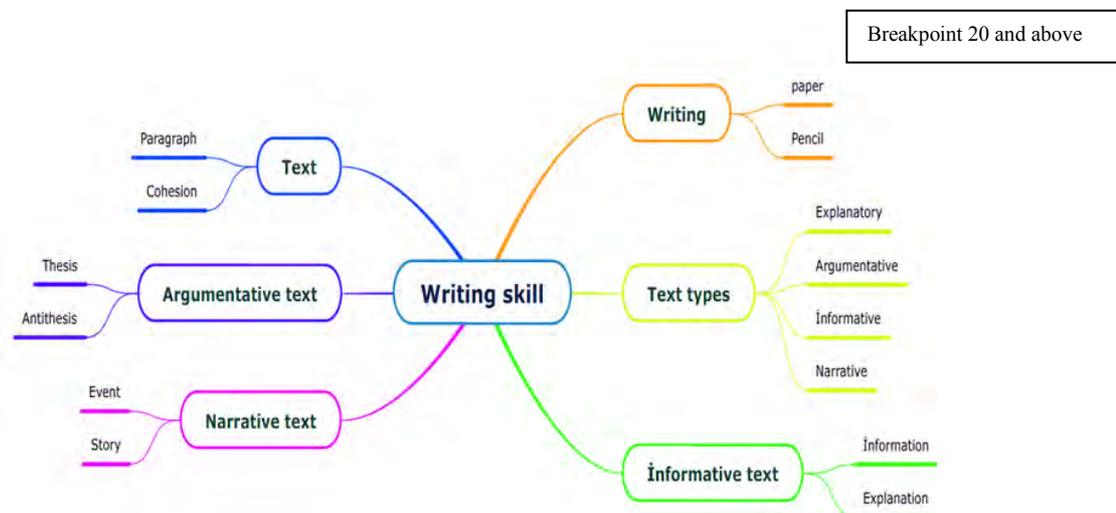
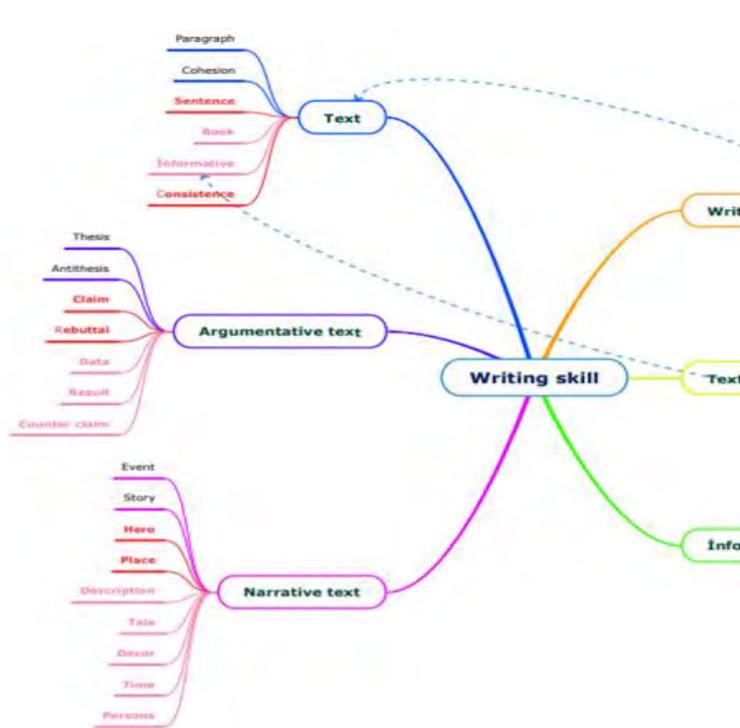


Figure 1: Pre-Test by Key Concepts

It was determined that two concepts related to each key concept were produced at breakpoint 20 and above. Although it is a pre-test, it can be said that the concepts produced are related to the key concept. Text (paragraph and cohesion), writing (paper and pencil), text types (explanatory, argumentative, informative, and narrative), argumentative text (thesis and antithesis), narrative text (event and story), and informative text (information and explanation) were detected, and the concept network was drawn in the form of six islets. It is understood that prospective teachers have misconceptions about text types because the concepts produced are structures related to the text.

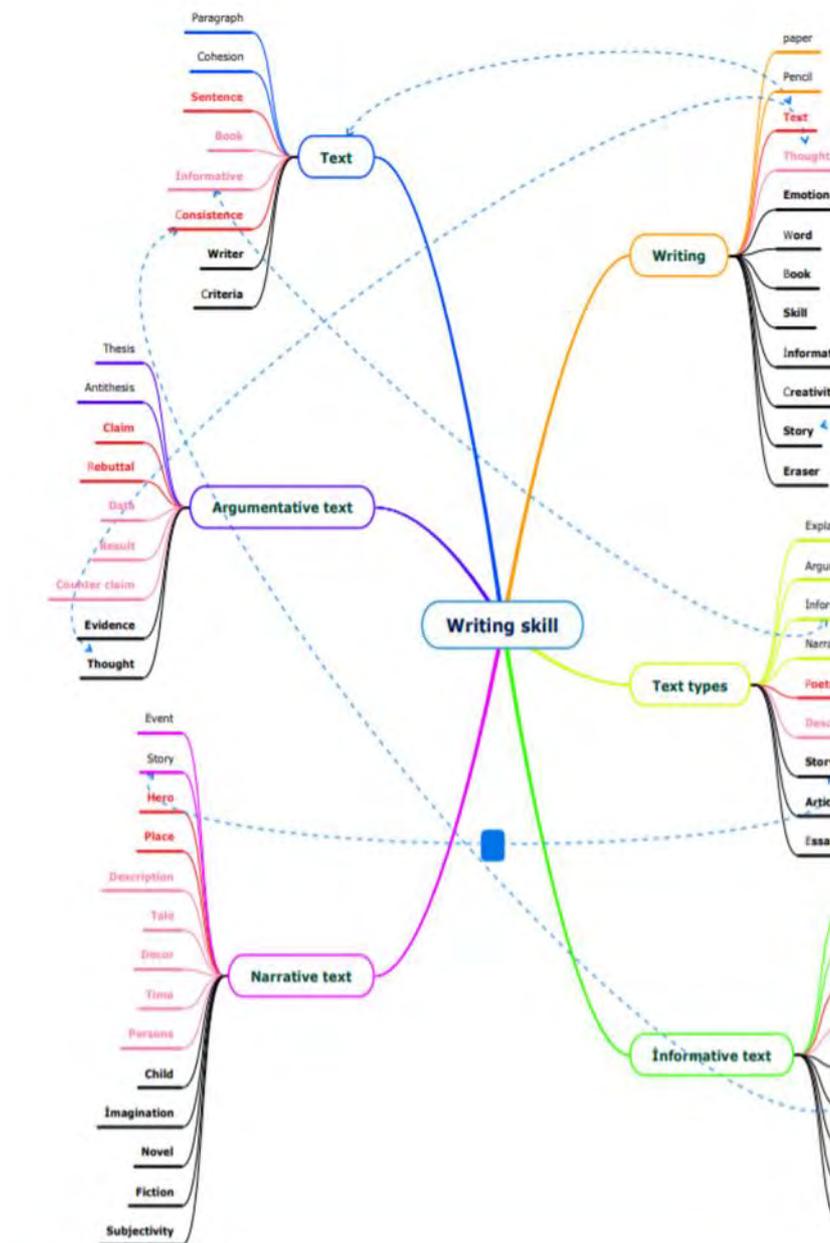


Considering the pre-test key-concept network with a breakpoint of 15-19, writing (text), text (sentence and consistence), text types (poetry), argumentative text (claim and counterclaim), narrative text (hero and place), and informative text (article) concepts were written. At this point, it is seen that the concepts are related to the key concepts.



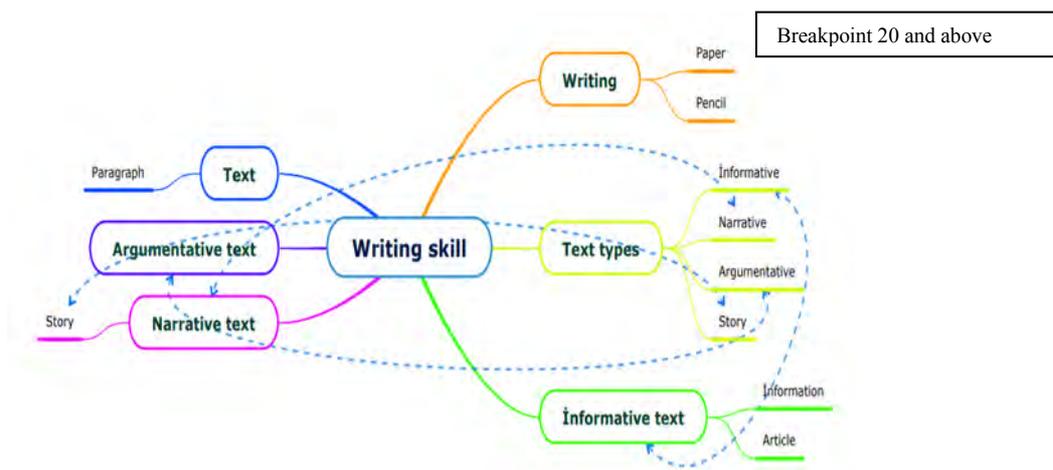
In the breakpoint 10-14, text (book – informative), writing (thought), text type (descriptive), informative text (objective), argumentative text (data, result, and counterclaim), and narrative text (story, description, decor, time, and persons) key concepts were suggested. It is seen that the concepts that emerge when the range decreases are related to the characteristics of the key concepts.

Breakpoint 5-9



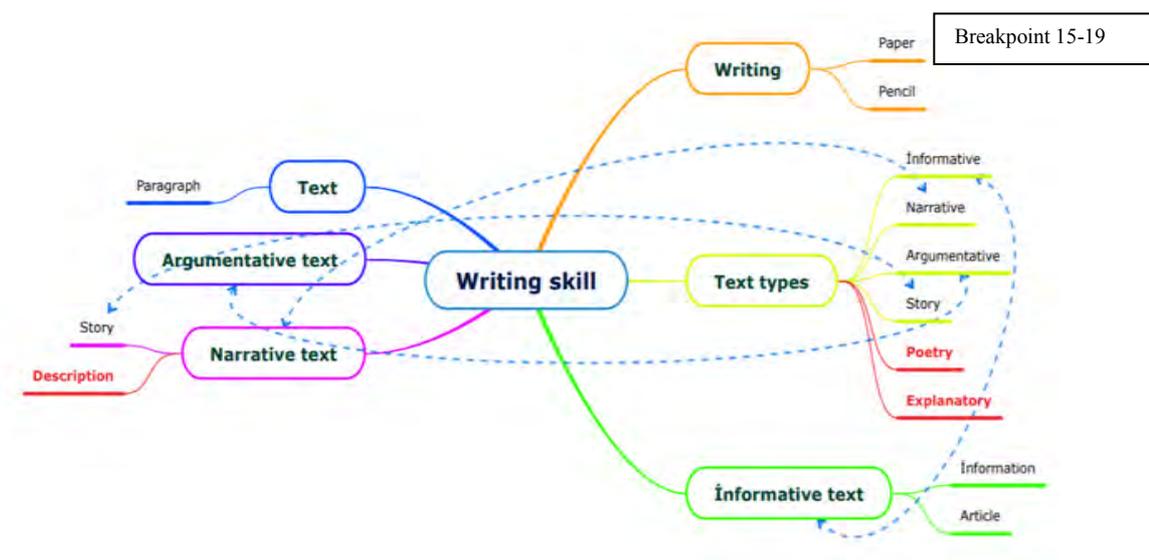
Key concepts in the post-test were written as text (writer, criteria), writing (emotion, word, book, skill, information, creativity, story, and eraser), argumentative text (evidence, thought), text types (story, article, and essay), narrative text (child, imagination, novel, fiction, and subjectivity), argumentative text (evidence, thought), and informative text (consistence, academic, definition, numeric data, and exemplification) concepts. It was observed that the concepts used on the subject increased when the breakpoints decreased. When the concept network of students' writing skills emerges, it is observed that key concepts are related between the concepts of text, informative, story, article, consistence, and thought.

According to the key concepts, the post-tests were categorized as breakpoint 20 and above, 15-19, 10-14, and 5-9, and the concept network was drawn as follows.

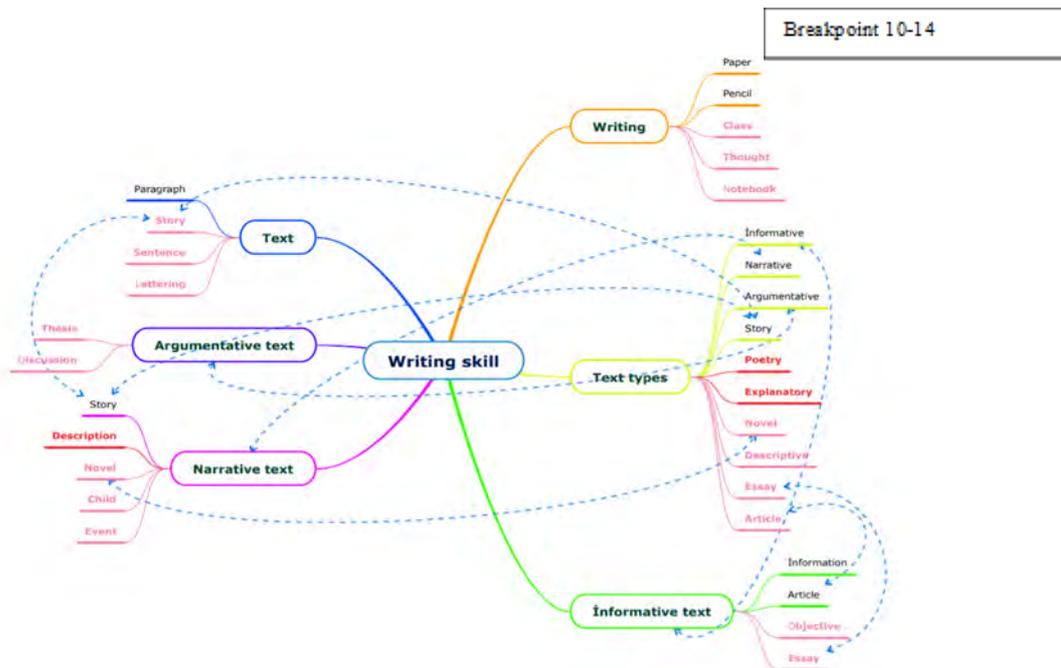


**Figure 2:** Post-Test by Key Concepts

A total of 10 concepts were produced in the key concepts of writing (pencil, paper), text types (informative, narrative, argumentative, story), text (paragraph), narrative text (story), and informative text (article, information). They are associated with the concepts of story, informative, and narrative.



It is seen that three key concepts are added at this breakpoint. Narrative text (description) and text type (poem, explanatory) are the new associated concepts.



A total of 16 words were added at this breakpoint: writing (class, thought, notebook), text (story, sentence, lettering), argumentative text (thesis, discussion), text types (novel, descriptive, essay, and article); narrative text (novel, child, and event), and informative text (objective, essay) concepts were produced. A common relationship was established in the concepts of essay, novel, and story.

Breakpoint 5-9



32 words were suggested at this breakpoint: text (word, book, subject, information, narrative, novel, discussion, and reader), writing (book, sentence, lettering, emotion, writer, and lesson); argumentative text (subject, antithesis, counterclaim, defense, observation, subjective, and positive), text types (didactic, fable); narrative text (Ömer Seyfettin, plot, time, fable, place, imagination, and character), and informative text (anecdote, scientificity). A connection is provided in the concepts of book, sentence, lettering, fable, subject, novel, discussion, and narrator.

**Table 2:** Pre-Test Frequency Table of Associated Sentences Suggested by Students Regarding Key Concepts

Key Concepts	Sentences with Academic Information	Sentences Without Academic Information	Sentences Containing Misconceptions
Writing	23	31	4
Text	20	27	5
Text Types	15	37	2
Informative Text	27	28	6
Narrative Text	11	41	6
Argumentative Text	20	25	6
	116	189	29

**Table 3:** Post-Test Frequency Table of Associated Sentences Suggested by Students Regarding Key Concepts

Key Concepts	Sentences with Academic Information	Sentences Without Academic Information	Sentences Containing Misconceptions
Writing	29	19	3
Text	27	19	3
Text Types	27	24	-
Informative Text	26	21	2
Narrative Text	31	20	1
Argumentative Text	29	12	4
	179	115	13

When the above tables are examined, it can be claimed that the participants experienced positive developments in terms of conceptual change. While the number of sentences with academic information about key concepts increased from the pre-test to the post-test ( $f=116$ ;  $f=179$ ), there was a decrease in the sentences without academic information ( $f=189$ - $f=115$ ). This indicates that the education given is organized in accordance with the cognitive structures of the students in writing education. Besides, the decrease in sentences containing misconceptions ( $f=29$ -  $f=13$ ) supports this situation.

**Table 4:** Some Samples of Associated Sentences Obtained Based on Pre-Test Data

Key Concepts	Sentences with Academic Information	Sentences Without Academic Information	Sentences Containing Misconceptions
Writing	<ul style="list-style-type: none"> <li>- Writing is hard work.</li> <li>- Writing is a skill that requires education.</li> <li>- Writing is the transfer of feelings and thoughts to paper.</li> <li>- Writing makes narration easier.</li> </ul>	<ul style="list-style-type: none"> <li>- My brother's handwriting is very beautiful.</li> <li>- I take my pencil and start writing in my notebook.</li> <li>- Writing is the art of painting with words.</li> <li>- Writing is one of the most difficult language skills.</li> </ul>	<ul style="list-style-type: none"> <li>- Text linguistics studies the coherence in the surface structure of the text.</li> </ul>
Text	<ul style="list-style-type: none"> <li>- The text should not contradict itself and be consistent.</li> <li>- Text is formed by letters coming together to form a word, words to form a sentence, and sentences to form paragraphs.</li> <li>- There should be coherence and consistent elements in the text.</li> <li>- Each text carries traces of other texts.</li> </ul>	<ul style="list-style-type: none"> <li>- An organized community circulating in white pages.</li> <li>- We used ways to develop thinking in the text we created.</li> <li>- Learning through text is fun.</li> <li>- I read a nice essay text last night.</li> </ul>	<ul style="list-style-type: none"> <li>- In a seminar at the school, fellow speakers gave a speech on psychology.</li> </ul>
Text Types	<ul style="list-style-type: none"> <li>- Text types should not be given directly to students; they should be implied beforehand.</li> <li>- Text type is found by examining its content and narrative style.</li> <li>- Text types are examined under three categories.</li> <li>-Text types are indispensable for the literature course.</li> </ul>	<ul style="list-style-type: none"> <li>- We were asked to prepare a board about text types.</li> <li>- It is very difficult to distinguish text types.</li> <li>- I can distinguish between informative and narrative text types.</li> <li>- Writing an effective and beautiful story requires ingenuity.</li> </ul>	
Informative Text	<ul style="list-style-type: none"> <li>- Informative texts are objective texts that make readers think.</li> <li>- Texts written on the basis of certain evidence are named informative texts.</li> <li>- In informative texts, it is necessary to benefit from numerical data, explanatory information, and examples from time to time.</li> <li>- Objective information is dominant in informative text type.</li> </ul>	<ul style="list-style-type: none"> <li>- I think that with the help of an informative text, I can get rid of harmful habits.</li> <li>- Informative texts form the infrastructure of science.</li> <li>- In the articles, some information, thought, or concept is tried to be conveyed by the teachers.</li> <li>- We often come across informative texts.</li> </ul>	<ul style="list-style-type: none"> <li>- In the event about the treatments for medical students of our university, very important information was mentioned.</li> </ul>
Narrative Text	<ul style="list-style-type: none"> <li>- Narrative texts are texts that develop the child's imagination.</li> <li>- Elements in narrative texts are event, person, place, and time.</li> </ul>	<ul style="list-style-type: none"> <li>- 5th and 6th-grade level narrative texts are quite clear.</li> <li>-In narrative texts, events</li> </ul>	

	<ul style="list-style-type: none"> <li>- In narrative texts, the hero is introduced by description.</li> <li>-Fictional meaning is presented to us in narrative texts.</li> </ul>	<ul style="list-style-type: none"> <li>happen with heroes.</li> <li>- Narrative texts attract the attention of children more.</li> <li>- I love reading stories at night and thinking about this story I read.</li> </ul>	
Argumentative Text	<ul style="list-style-type: none"> <li>- The argumentative text aims to make the author's own opinion accepted by the opposing view.</li> <li>- It is the process of accepting an idea as a result of the evaluation of thought and an opposing thought.</li> <li>- In the argumentative text, first of all, the data should be specified, and appropriate claims should be supported by counterclaims, but it is not always necessary to comply with the counterclaim.</li> <li>- There are two opposing thoughts in the argumentative texts.</li> </ul>	<ul style="list-style-type: none"> <li>- Argumentative texts allow us to have broader knowledge about a topic.</li> <li>- Conditional acceptance was not included in this argumentative text.</li> <li>- Argumentative texts are informative texts. Everyone who reads is more or less knowledgeable.</li> </ul>	

**Table 6:** Some Samples of Associated Sentences Obtained Based on Post-Test Data

Key Concepts	Sentences with Academic Information	Sentences Without Academic Information	Sentences Containing Misconceptions
Writing	<ul style="list-style-type: none"> <li>- Writing is the transfer of feelings and thoughts to paper with certain tools and materials.</li> <li>- While writing, we choose words from the generative vocabulary.</li> <li>- Writing is an important tool in reflecting our emotions.</li> <li>- Writing is the alphabetization of the thoughts coming out of the memory from the deep structure to the surface structure.</li> </ul>	<ul style="list-style-type: none"> <li>- Writing is a game that is as tiring as it is enjoyable.</li> <li>- A good pen is required for writing.</li> <li>- He loves to write poetry with his favorite pen.</li> <li>- Our writing was bad, although life offered good poems.</li> </ul>	
Text	<ul style="list-style-type: none"> <li>- Text is to convey information in a certain order using textuality criteria.</li> <li>- The texts are fictional or informative texts that have rules in themselves.</li> <li>- Writing text requires great attention.</li> <li>- The text is paragraphs formed by the juxtaposition of sentences about a particular topic.</li> </ul>	<ul style="list-style-type: none"> <li>- He read a text about the life of owls.</li> <li>- The text in which this love story was told took a very long time.</li> <li>- Reading texts can sometimes be very long.</li> <li>- Reading long texts tires the eyes.</li> </ul>	- Metin went to school.
Text Types	<ul style="list-style-type: none"> <li>- There are text types created to explain a feeling and thought, idea, or to give information about that</li> </ul>	<ul style="list-style-type: none"> <li>- There are many text types.</li> <li>- The text I read was</li> </ul>	

	<p>subject.</p> <ul style="list-style-type: none"> <li>- Text types vary by the purpose of the text.</li> <li>-Text types must be distinguished.</li> <li>-Text types are not given directly in primary education.</li> </ul>	<p>informative.</p> <ul style="list-style-type: none"> <li>- Texts of different genres help our minds work.</li> <li>- It is the narrative text type that I like the most among the text types.</li> </ul>	
Informative Text	<ul style="list-style-type: none"> <li>- It is essential to provide information in informative texts, and this information should be supported by numerical data.</li> <li>- Informative texts are used in education to inform and explain students.</li> <li>-Informative texts are written to inform the reader.</li> <li>-Informative texts usually start with definition sentences.</li> </ul>	<ul style="list-style-type: none"> <li>- Informative texts about education should be created.</li> <li>- Children should read informative text.</li> <li>- If we want to convey information about a particular subject, we can use informative texts.</li> <li>- The subject that I understand best from text types is informative.</li> </ul>	<ul style="list-style-type: none"> <li>- Today, the teacher gave his students homework about animation.</li> <li>- Uranus is one of the celestial planets.</li> </ul>
Narrative Text	<ul style="list-style-type: none"> <li>- In narrative texts, the plot is usually given in sequence.</li> <li>- There is a plot in the narrative texts.</li> <li>- It is among the text types created in the style of story and novel by using event, person, time, and place.</li> <li>- It is fictional.</li> </ul>	<ul style="list-style-type: none"> <li>- My favorite story writer is Ömer Seyfettin.</li> <li>- Generally, narrative texts attract children's attention.</li> <li>- Create a narrative text that everyone builds with their own sentences.</li> <li>- An adventure event is usually told in narrative texts.</li> </ul>	
Argumentative Text	<ul style="list-style-type: none"> <li>- In argumentative texts, while the author supports his own claimed view, he also aims to refute the opposing view.</li> <li>- Argumentative texts in education enable students to evaluate opposing and different ideas.</li> <li>- The argumentative text consists of thesis and antithesis.</li> <li>- The argumentative text is to criticize and interpret the subject in an appropriate style.</li> </ul>	<ul style="list-style-type: none"> <li>- Argumentative texts lead people to find the truth.</li> <li>- Argumentative texts are stimulating.</li> <li>- Argumentative texts allow children to voice their opinions.</li> <li>- We learned the argumentative text features in the lesson.</li> </ul>	<ul style="list-style-type: none"> <li>- There was a dispute in the classroom.</li> <li>- The young man, whose request to play volleyball was rejected, got into a pointless dispute with us.</li> </ul>

When the sample sentences formed by prospective Turkish teachers related to the concepts were examined in terms of the pre-test and post-test, the quality of the sentences containing academic knowledge showed a positive change. Additionally, there was a decrease in the sentences without academic information compared to the pre-test. The rate of scientific knowledge in the statements of the students increased. The frequency of misconceptions decreased in the post-tests of key concepts with misconceptions. The most misconceptions were experienced in the key concepts of “informative,

narrative, and argumentative texts” ( $f=6$ ). In the post-tests, this frequency is ordered as “informative text ( $f=2$ ), narrative text ( $f=1$ ), and argumentative text ( $f=4$ )”.

### **Discussion and Conclusion**

Turkish teachers are those who educate the students in accordance with the curriculum within the framework of language skills. With the Turkish course curriculum (2019), it is necessary to “ensure that students use Turkish consciously, correctly, and carefully with respect to the rules of writing.” In this respect, prospective Turkish teachers need to be aware of their cognitive structures related to writing skills. To this end, this study aimed to reveal the concepts in the minds of prospective Turkish teachers regarding writing skills, the relationships between them, and conceptual misconceptions.

According to the findings, academic changes were observed in the pre-test and post-test results in the key concepts of “writing, text, text types, narrative text, informative text, and argumentative text.” In terms of concepts, it is ( $f=1.636$ ) in the pre-test and ( $f=1.732$ ) in the post-test. It is seen that prospective teachers who indicate concepts related to each key concept can establish relationships between concepts as the breakpoint decrease. Besides, the changes between the pre-test and post-test are positive. The number of sentences containing academic information about key concepts increased from pre-test to post-test ( $f=116$ ;  $f=179$ ). Additionally, the number of sentences without academic information ( $f=189$ - $f=115$ ) decreased. This situation shows that the education given is organized in accordance with the cognitive structures of the students in writing education. Meanwhile, the decrease in sentences containing misconceptions ( $f=29$ -  $f=13$ ) supports this situation. When the sentences were examined in terms of including scientific information, it was found out that academic expressions were used more accurately, and misconceptions were reduced.

As a result of this research, it was concluded that the word association test effectively determined the connections between concepts, cognitive structures, and misconceptions of prospective teachers. Other studies in the literature (Bahar, Johnstone, & Sutcliffe, 1999; Tsai & Huang, 2002; Bahar & Özatlı, 2003; Ercan, Taşdere & Ercan, 2010) also support this result. When the studies using the word association test are considered, previous research were conducted on science (Bahar, Johnstone, & Sutcliffe, 1999; Tsai & Huang, 2002; Bahar & Özatlı, 2003; Ercan, Taşdere, & Ercan, 2010; Kaya & Akış, 2015; Sarođlan & Çelik, 2021; Kostavo & Radoynovska, 2008; Cardellini & Bahar, 2000; and Hovardas & Korfiatis, 2006), social sciences of history and geography (Kaya & Aladađ, 2021; Özkarol & Bozyiđit, 2021; Duban & Küçükyılmaz, 2008; and Işıklı, Taşdere, & Göz, 2011). However, word association tests are important in revealing the cognitive structures of both teachers and students in different language skills in the field of language teaching. Therefore, researches can be increased in this direction.

## References

- 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. <https://doi.org/10.1080/00219266.1999.9655653>
- 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.
- Bereiter, C. And Scardamalia, M. (1996). Does learning to write have to be so difficult? A. Freedman, I. Pringle, J. Yalden (Eds). *Learning to write: First language/Second Language*. Sixth Impression. London and New York: Longman.
- Bostan Sarioğlan, A., & Çelik, A. (2021). Sorgulamaya dayalı öğrenmenin ortaokul 5. sınıf öğrencilerinin fikirleri üzerine etkisinin kelime ilişkilendirme testi kullanılarak belirlenmesi. *Bilim, Eğitim, Sanat ve Teknoloji Dergisi*, 5(2), 138-159.
- Cardellini, L., & Bahar, M. (2000). Monitoring the learning of chemistry through word association tests. *Australian Chemistry Research Book*, 19, 59- 69.
- Dilidüzgün, Ş. (2019). Yazma Becerisinin Önemi. Bayat, N. (Ed), *Yazma ve Eğitimi*. Anı yayıncılık, Ankara, 187-222.
- Duban, N. & Küçükyılmaz, E. A. (2008). Sınıf öğretmeni adaylarının alternatif ölçmedeğerlendirme yöntem ve tekniklerinin uygulama okullarında kullanımına ilişkin görüşleri. *İlköğretim Online*, 7(3), 769-784.
- Ercan, F., Taşdere, A. & Ercan, N. (2010). Kelime ilişkilendirme testi aracılığı ile bilişsel yapının ve kavramsal değişimin gözlenmesi. *Türk Fen Eğitim Dergisi*, 7(2), 136-154.
- Gilbert, J. K., Boulter, C., & Rutherford, M. (1998a). Models in explanations, part 1, Horses for courses? *International Journal of Science Education*, 20, 83-97.
- Gilbert, J. K., Boulter, C., & Rutherford, M. (1998b). Models in explanations, part 2, Whose voice? Whose ears? *International Journal of Science Education*, 20, 187-203.
- Gilbert, J. K., & Boulter, C. J. (2000). Learning science through models and modeling. In K Tobin., & B Frazer (Eds.), *The international handbook of science education* (pp. 53-66). Dordrecht: Kluwer.
- Hovardas, T., & Korfiatis, K. J. (2006). Word associations as a tool for assessing conceptual change in science education. *Learning and Instruction*, 16, 416-432. <http://dx.doi.org/10.1016/j.learninstruc.2006.09.003>
- Işıklı, M, Taşdere, A. & Göz, N. L. (2011). Kelime ilişkilendirme testi aracılığıyla öğretmen adaylarının atatürk ilkelerine yönelik bilişsel yapılarının incelenmesi. *Uşak Üniversitesi Sosyal Bilimler Dergisi*, 4(1), 50-72.
- Kaya, B., Akış, A. (2015). Coğrafya öğrencilerinin “hava” kavramıyla ilgili bilişsel yapılarının kelime ilişkilendirme testi ile belirlenmesi. *Turkish Studies*, 10(7), 557- 574.

- Kostavo, Z. & Radoynovska, B. (2008). Word association test for studying conceptual structures of teachers and students. *Bulgarian Journal of Science and Education Policy*, 2(2), 209-231.
- Kurt, H., Ekici, G., Aktas, M., & Aksu, Ö. (2013). Determining Biology Student Teachers' Cognitive Structure on the Concept of "Diffusion" through the Free Word-Association Test and the Drawing-Writing Technique. *International Education Studies*, 6(9), 187-206.
- Onan, B. (2020). *Dil eğitiminin temel kavramları*. Nobel Akademik Yayıncılık.
- Ozkartal, 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.
- Patton, M. Q. (2014). *Nitel Araştırma ve Değerlendirme Yöntemleri* (3. Baskıdan Çeviri). (Çeviri Editörleri: Mesut Bütün, Selçuk Beşir Demir). Ankara: Pegem Akademi.
- Tsai, C. C., Huang, C. M. (2002). Exploring student's cognitive structures in learning science: A review of relevant methods. *Journal of Biological Education*, 36, 163-169.
- Ülgen, G. (2001). *Kavram Geliştirme, Kuramlar ve Uygulamalar*. Ankara: Pegem Akademi Yayıncılık.
- White, R. And Arndt, V. (1991). *Process writing*. London: Longman.