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Research Article

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EXAMINING THE COGNITIVE STRUCTURES OF TEACHER CANDIDATES ON THE ENVIRONMENTAL ETHICS CONCEPT[1]

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ABSTRACT

Environmental ethics, which investigates human's moral relations with the environment philosophically, significantly affect the attitudes and behaviors of the individual towards the environment. This study aims to determine how teacher candidates form a link in their cognitive structures concerning the concept of environmental ethics and to evaluate the parts comparatively so that the established network of knowledge can be resolved. The study group consists of 150 university students whose social studies teachers, science and technology teachers and elementary school teachers are determined by the sample criteria of the 3rd and 4th grades of Siirt University at Education Faculty during the spring of the 2016-2017 academic year. Word association test was used as a data collection tool in the study. In the analysis of the obtained data, a frequency table generated from the responses given to the environmental ethics key concept was utilized. Besides, a network of concepts has been established to reveal the cognitive structures of the obtained data and teacher candidates separately and as a whole. It has been determined that the concept of "environmental ethics" as a whole is derived from teachers' candidates in terms of environmental ethics when evaluated in terms of content and ethics. In terms of departments, social science teachers and prospective teachers who read in elementary school teacher are more abstract words with ethical meaning when they are evaluated in frequency, while candidates in science knowledge use more concrete words. When the frequency table of the teachers' candidates about the concept of environmental ethics is examined, it has been determined that the social studies, elementary school, and science teacher candidates are inadequate in establishing scientific knowledge.

Keywords: Environmental ethics, cognitive structure, teacher candidates

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INTRODUCTION

Environmental ethics, which examines human's moral relations with the environment thoughtfully, significantly affect the attitudes and behaviors of the individual towards the environment. Accordingly, in recent years, the ethical behaviors of people in the environment have started to be questioned. The concept of ethics is described as general moral rules covering all people, times and places (Kayaer, 2013). It is a form of critical inquiry that has a logical bases that tries to determine the lines between good and bad (Karakoç, 2004). On the other hand, environmental ethics is a philosophical approach that examines the moral relations of people with the environment. A theoretical discipline that studies all kinds of attitudes and behaviors that can be effective concerning nature or elements of nature (Karaca, 2007) or it is defined as a systematic evaluation of the ethical relationship between human beings and the natural environment (Ertan, 2004). Environmental ethics is a subdivision of ethics that refers to the ethical philosophy and explores the nature of ethical behavior in matters related to the environment. Tries to determine what the relationship between human beings and nature should be and what is the right behavior (Amenbauer, 1998; cit: Karaca, 2007). Therefore, environmental ethics is questioning what the moral values of people have in the face of nature, and how the relations between human and the environment should be shaped within the framework of the values and rules of society, what people and who Responsibility. In brief, environmental ethics examines the ethical responsibilities of a person to the natural environment (İlhan, 2013). For this reason, environmental ethics is an interdisciplinary concept with many disciplines ranging from biology, theology, philosophy, educational sciences, and law. Therefore, studies on environmental ethics are essential in terms of contributing to the field. When the field literature is examined, it is seen that there are two different approaches to environmental ethics, namely traditional and modern environmental ethics approaches. Traditional environmental ethics approaches are classified as beneficial ethics, deontology-homework, and right ethics and religious ethics approaches. (Des Jardins, 2006). According to the teleology approach, all objects have a natural and distinctive function. According to the beneficiary environment ethic approach, it is necessary to evaluate the ethical situation of the action by looking at the results of each act (Ceylan, 2012). According to the Deontology-homework and rights ethics approach, it is more important to look at the principle that it relies on than looking at the outcome of the actions. Human beings are rational (intelligent) entities and are responsible for their intentions in an ethical way because they do not act with their instincts. In the religious environmental ethic approach, every religion is inclined to protect the natural environment. People who value life and living creatures have responsibilities to them (Agbuba, 2016).

Modern environmental ethics approaches are classified as human-centered (antropolaristic), live-centered (biocentrism), environmental-centered (holistic) and ecological thinking (ecologism) centered environmental ethics approach. According to the human-centered environmental ethic approach, it is necessary to protect nature as long as it is beneficial to people in terms of economic, ecological and aesthetic. However, nature can intervene if there is a human benefit at the point of intervention in nature (Birden, 2016). In the living-centered environmental ethic approach, human beings and other living beings have equal rights. According to this, people are the same in value to other living things. In the environment-centric environmental ethics approach, all beings

in the universe are a link to the chain and have different functions and equal rights. Unlike other approaches, environment-based environmental and non-living assets also include environmental ethics. According to this understanding, there is a responsibility to protect the environment and to leave it for future generations. In the ecological centered environmental ethic approach, social and economic aspects suggest that the relationship with nature must be restructured (Ağbuğa, 2016; Ertan, 2004; Keleş & Ertan, 2002; Kayaer, 2013). According to this, the environmental ethics of the ethical dimension of human and nature relations, constitute one of the most important subjects of environmental education as it is in many disciplines. Birden's (2016) study on the environment concerning the individual's moral responsibility has also indicated the necessity of taking care of environmental values to increase the awareness of the individual responsible for the protection of the environment.

In the study conducted by Keleş & Özer (2016) examining the environmental awareness of teacher candidates, there were significant differences between the environmental variations of the teacher candidates. The study of university students' perceptions of environmental ethics by Gercek (2016) indicated that the perceptions of students about environmental ethics were intermediate and there was no significant difference according to gender variables. Tunç & Yenice (2017) in the study, where science teacher candidates examine their ethical views towards the environment and their attitudes toward the sustainable environment, the environmental-centered attitudes of the science teacher candidates are high more than human-centered attitudes. Karakaya & Yılmaz (2017) stated that the teachers 'perception of environmental awareness in terms of various variables indicated that teachers' perceptions of environmental awareness did not show any significant difference according to gender and educational level variables. Sungur (2017) stated that the level of education of university students increased their attitudes towards environmental ethics as a result of studying the ethical attitudes towards university students. Besides, although research on environmental ethics in Turkey has recently been examined in the field article, there are no studies on how the concept of environmental ethics is done in the cognitive structures of students. The cognitive structure is defined as the mental scheme that regulates and holds the elements that compose knowledge in the event of any learning (Uçak & Güzeldere, 2006). The cognitive structure, however, is a hierarchical order and varies from individual to individual. At the same time, the cognitive structure is defined as a network or schema that describes the relationships between concepts in an individual's mind (Tokcan & Yiter, 2017).

Purpose of the Research

The cognitive structure of the individual influences his / her perception, perception, understanding, conceptualization, problem-solving ability and decision making. According to this, individuals, when faced with any situation or problem-related to the protection of the environment, primarily produce solutions depending on their perception in their minds. At this stage, it is thought that the pre-service teachers who will be the implementers of environmental education programs will construct their cognitive minds in the solution of environmental problems in the cognitive minds and it will be important to develop environmentally responsible

behaviors in the students who will give environmental education in the future. The aim of this study is to investigate the cognitive structures of the teacher candidates in different programs by using the word association test.

The Status of Problem

1- How are the pre-service teachers' cognitive structures related to the concept of environmental ethics?

METHOD

Research Design

In this study, the survey model was used. According to Karakaya (2014), screening research in social sciences is widely used, and the research conducted on large groups, the opinions of individuals and events concerning cases, attitudes, and cases are depicted. Screening models are research approaches that aim to describe an existing situation. Research subjects are tried to be defined as in their conditions (Karasar, 2012). In this study, the cognitive structures related to the concept of "environmental ethics" of teacher candidates who study in different programmes and alternative concepts about "environmental ethics" have been determined according to this pattern.

The Study Group

The study group of the research team constitutes a total of 150 teacher candidates who are enrolled in the 3rd and 4th classes registered to Siirt University at Education Faculty, science education, social studies education, and elementary school teacher program in the spring semester of the 2016-2017 academic year. In this context, research has been conducted with 50 teachers from the elementary school teacher program, 50 from the science teacher education program and 50 teachers from the social studies teaching the program. The sample of the study was determined according to the criterion sampling method which is one of the non-random sampling methods. In this context, teachers who have taken courses such as environmental education or environmental science at the undergraduate level in determining the candidates for the teacher, and candidates who are tasked with teaching students about environmental ethics in the future are considered as criteria. Also, students who participated in the study volunteered to participate in the research and have the potential to collect data on environmental ethics were also taken into attention.

Data Collection Tool

In this study, the Word Association Test (WAT) was used as a data collection tool. The word association test is one of the techniques used to analyze the cognitive structure of prospective teachers and to analyze the linkages between concepts in this structure and to determine whether the relationships between the concepts in the long-term memory (Özatlı & Bahar, 2010). In this research, the concept of "environmental ethics" was asked to

prospective teachers in different programs. In this context, the concept of environmental ethics for teacher candidates is given in the following format by keyword.

Environmental Ethics ……
Environmental Ethics ……
Environmental Ethics ……
Environmental Ethics ……
Environmental Ethics ……

Related Sentence ……..

Before the launch of the application, the teacher candidates were made a description of the word association test and were asked to write the first five words for the fundamental concept of environmental ethics within 30 seconds. Besides, teacher candidates were required to write a sentence related to the environmental ethics key concept. It is stated that the relevant sentence formed by the teacher candidates is more important in the process of evaluating situations such as whether they contain scientific, superficial or conceptual misconceptions that they are more complex and higher level structure than single words (Ercan, Taşdere & Ercan, 2010; Kurt & Ekici, 2013).

Analysis of Data

In the analysis of the data, the Word association test results were examined in detail according to the content analysis method of the answers given to key concepts by the teacher candidates. Accordingly, a detailed frequency table has been created to indicate how many times the words or concepts of environmental ethics are repeated. In addition, the frequency table created using the answers of theirs gave; the concept networks were designed. At this stage, the cut-off point technique introduced by Bahar, Johnstone & Sutcliffe (1999) was used to demonstrate the relationship between the conceptions of cognitive constructs of the concept of environmental ethics of prospective teachers in different programs. In this technique, the most given answer for any key concept in the frequency table is determined as the breakpoint below a certain frequency of the word. The answers above the breakpoint are used to create the concept network. Then, the breakpoint is pulled down with specific intervals, and the process continues until all the keywords are in the concept network. The concepts that arise within each breakpoint range are repeated until the number of students in that range. The concept networks created in the research are sorted from high frequencies to low frequency. Also, rates were interpreted as elementary, science, and social studies teachers to compare the correlations between concepts. In the analysis of the data, concept networks were established according to the cut-off points of frequencies 30 and above, 20-29, 15-19, 10-14.

FINDINGS (RESULTS)

In this section, the findings obtained from the word association test for the concept of environmental ethics of teacher candidates are presented to the study. The findings of the total frequencies of the words produced by the teacher candidates who study in different programs are given in table-1.

Table 1. Total Word Frequencies Belonging to the Teacher Candidates.

Teacher Candidates	Word Count
Science Teacher program	250
Elementary School Teacher Program	250
Social Studies Teacher program	226
Toplam	**726**

As seen in Table-1, it was determined that the teacher candidates produced a total of 726 words related to the concept of environmental ethics. Two hundred fifty of these words were provided by the elementary school teacher and science teacher programs and 226 by teacher candidates of social studies teacher program. A conceptual network of words with a cut-off point of 30 is given from the answers given to the concept of environmental ethics of teacher candidates who are studying in different programs in figure-1

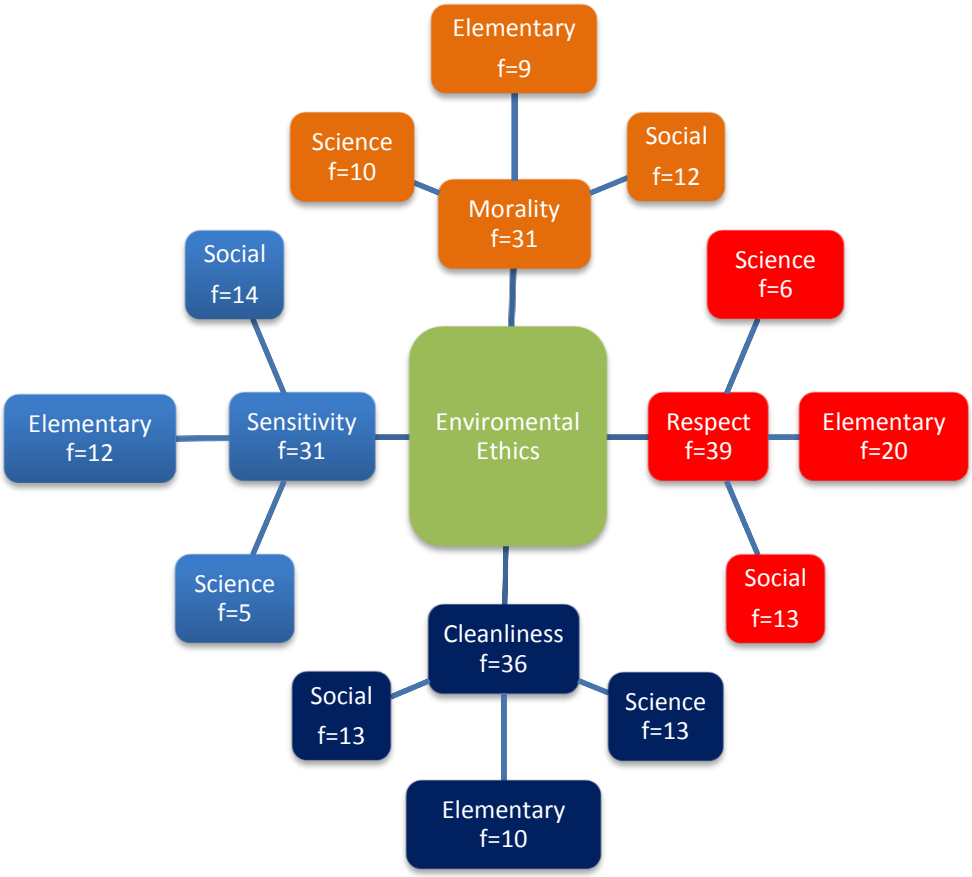

Figure 1. The Concept Network Formed According to The Cutting Point 30 and Up

In this cutting point, as shown in figure-1, the teacher candidates ' cognitive structure in relation to the concept of environmental ethics, "respect (f = 39)", "cleansing (f = 36)", "morality (f = 31)" and "sensitivity (f = 31)" were found to be associated with the words. It can be said that the teacher candidates who are studying in different programs concerning the research have related the concept of environmental ethics with abstract words such as respect, morality, sensitivity, and cleanliness. However, when cognitive constructs related to the concept of environmental ethics of teacher candidates studying in different programs are examined, it has been determined that the frequencies of moral and clean words are equal to each other while the frequencies of respect and sensitivity words are higher.

When the distribution of the words according to frequency is examined, it was determined that social and science teacher candidates f=12, science teacher candidates' f=10 and elementary school teacher candidates' f=9 for moral word. For the word of honor, elementary school teacher candidates' f=20, social teacher candidates' f=13, and science teacher candidates' f=6 were found. For housekeeping words, science and social teacher candidates' f=13, elementary school teacher candidates' f=10; for sensitivity word, social teacher candidates' f=14, elementary school teacher candidates' f=12, science teacher candidates' f=5 were found. In the answers given to the concept of environmental ethics of teacher candidates, a concept network of word numbers 20-29 cut-off point is provided in figure-2

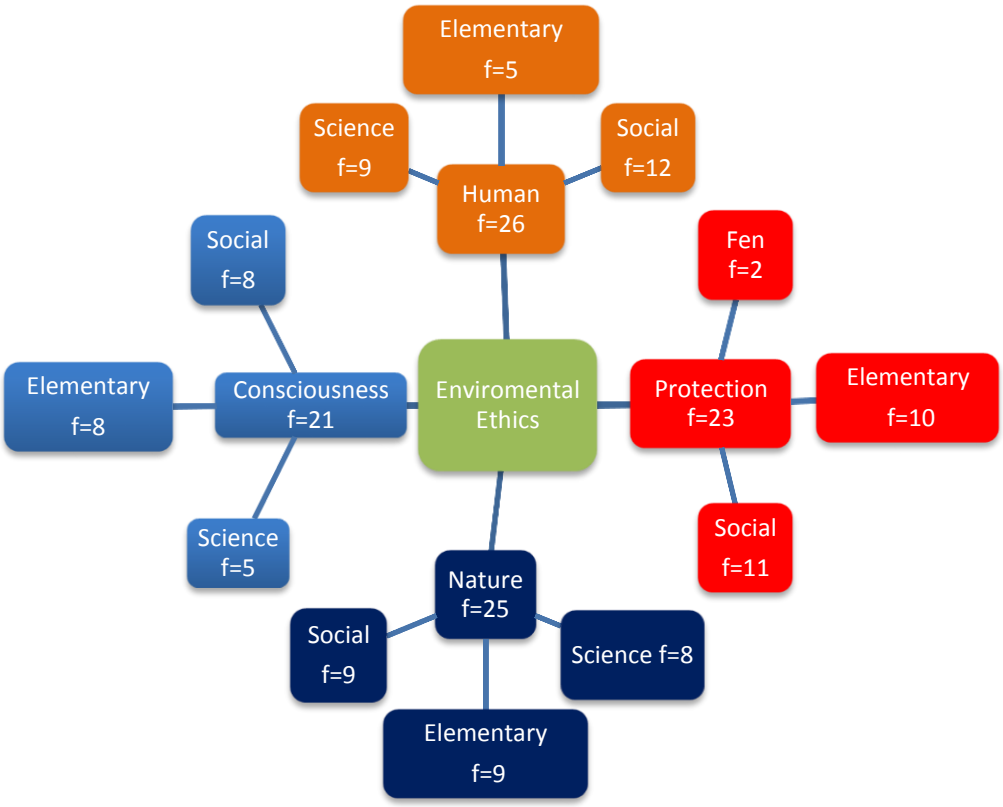

Figure 2. The Concept Network Formed According to The Cutting Point 20-29

As shown in Figure 2, the cognitive structure of the teacher candidates according to the previous interval in this breakpoint range, "four new words were produced, such as human (f = 26)," nature (f = 25) "," protection (f = 23) "and" consciousness (f = 21) ". When the frequency distribution of the words produced by the teacher candidates is examined; it was determined that social studies teacher candidates' f=12, science teacher candidates' f=9 and elementary school teacher candidates' f=5 for human word. Elementary school and social teacher candidates f=9 and science teacher candidates' f=8 for nature word. For protection word; social teacher candidates' f=11, elementary school teacher candidates' f=10, and science teacher candidates' f=2, for consciousness word; the elementary school and social teacher candidates' f=8, science teacher candidates' f=5. When the frequency distribution of the words produced in this cutting range is examined, the word "nature" is found to be almost the same number of candidates for teachers, but the frequencies of words such as human, protection, and consciousness are different from each other. The number of words from the answers given to the concept of environmental ethics of teacher candidates who study in various programs is presented in figure-3 of the concept network for the 15-19 breakpoint range.

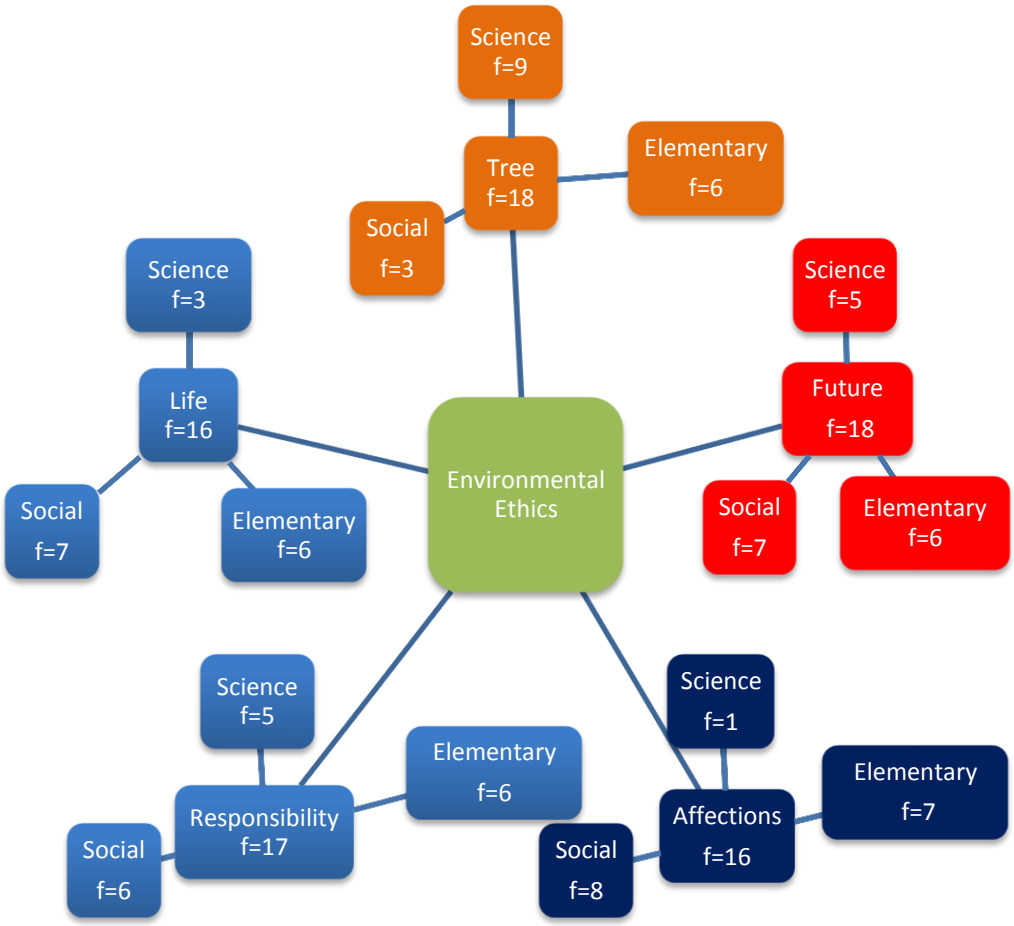

Figure 3. The Concept Network Formed According to The Cutting Point 15-19

As seen in figure 3, it was determined that in this cut-off period, the candidate teachers produced five new words in their cognitive structures related to the concept of environmental ethics. The words produced are "tree (f = 18)", "future (f = 18)", "responsibility (f = 17)", "love (f = 16)" and "life (f = 16)".

When the distribution of these words according to the teacher candidates who are educated in different programs is examined, the science teacher candidates' f=9, elementary school teacher candidates' f=6, social teacher candidates' f=3 for the tree word; social teacher candidates' f=7, elementary school teacher candidates' f=6 and science teacher candidates' f=5 for the future word. For the word of love, social teacher candidates' f=8, elementary school teacher candidates' f=7 and science teacher candidates' f=1; the elementary school and social teacher candidates' f=6 and science teacher candidates' f=5 for responsibility words. For the life word, it was determined that the social studies teacher candidates are f=7, the elementary school teacher candidates are f=6, and the science teacher candidates are f=3 In the research conducted in this cutting range, the teacher candidates in the different departments have been determined to relate the concept of environmental ethics to both abstract words such as future, love, responsibility, and life, as well as concrete words such as trees. The number of words from the answers given to the concept of environmental ethics of the teacher candidates is presented in Figure 4 of the concept network for the 10-14 breakpoint range.

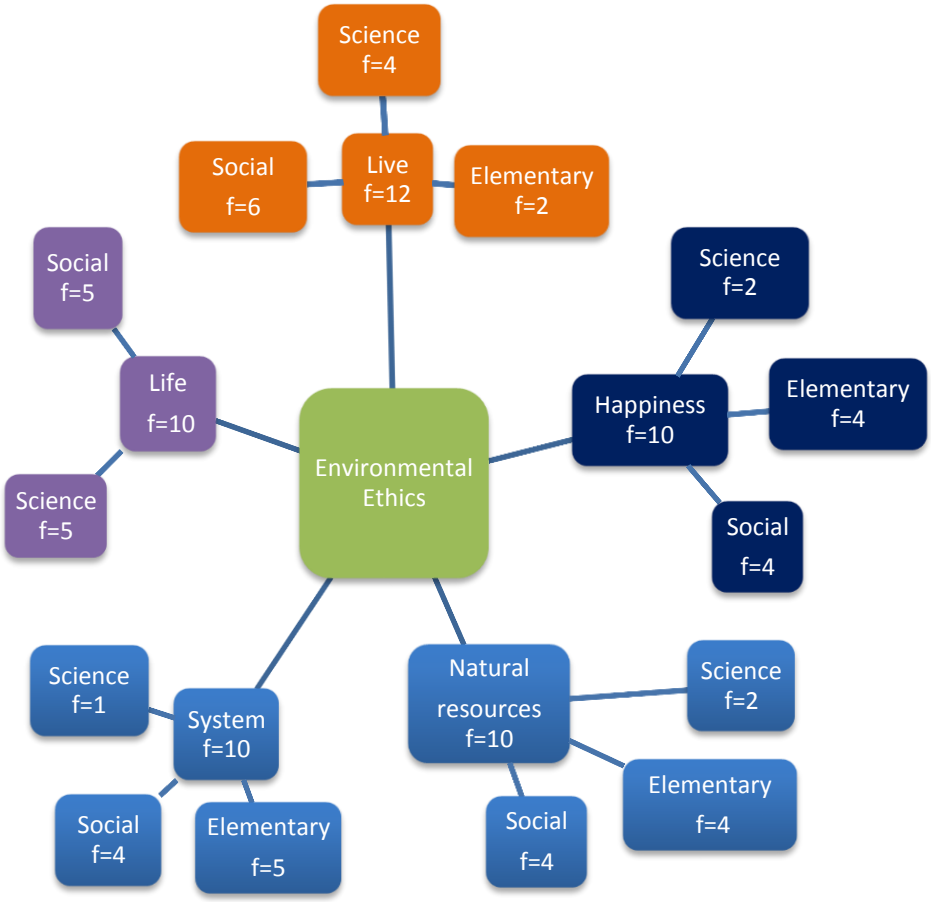

Figure 4. The Concept Network Formed According to The Cutting Point 10-14

As shown in Fig. 4, it was determined that five new words were produced in the cognitive structures of teacher candidates related to the concept of environmental ethics in this cut-off range. These are the words "live f=12", "life f=10", "happiness f=10", "system f=10" and "natural resources f=10". When frequency distribution is evaluated according to the programs of the produced words, the social science teacher candidates are f=6, science teacher candidates are f=4 and elementary school teacher candidates are f=2 for live word. The elementary school and social science teacher candidates are f=4, and science teacher candidates are f=2 for happiness. For natural resources, elementary school and social science teacher candidates' f=4 and science teacher candidates' f=2; for system word, elementary school teacher candidate' f=5, social science teacher candidates' f=4 and science teacher candidates' f=1 and for life word, science, and social teacher candidates' f=5 were found. In this cut-off period, it was determined that teacher candidates' concept of environmental ethics correlated intangible words such as life, system, and happiness in cognitive structures, while at the same time they relate concrete words such as live and natural resources.

Evaluation of The Answers Given by Teacher Candidates for Environmental Ethics.

In this study, the sentences of the teacher candidates who study in different programs are classified as scientific information, non-scientific and misconception. This important for students to understand how they can use the concept of environmental ethics and how they are cognitively structured. The sentences that were established by the teacher candidates for the key concept of environmental ethics were evaluated in the category of sentences containing "scientific knowledge" regarding the scientific definition of the concept. The sentences that the teacher candidates have established regarding the environmental ethics concept are classified in the category of "non-scientific information" which is far from the scientific meaning in everyday life but is used correctly as content. However, the sentences that the teacher candidates have established are classified in the category of sentences containing "concept misconception" or "concept mistake," whereas sentences that are of a concept or confusion with different meanings are far from science. In this study, the findings obtained according to the classification mentioned above are presented in table-2.

Table 2. The Frequencies of the Teacher Candidates' Statements Regarding the Concept of Environmental Ethics

Programs	Scientific information (f)	Non-scientific information (f)	Misconceptions (f)
Elementary school teaching	-	48	1
Science teaching	2	43	2
Social studies teaching	2	39	4

As shown in table-2, the number of sentences containing scientific information about the concept of environmental ethics was found to be f= 2 in the teaching of science and social studies and never in elementary education. When the number of sentences containing non-scientific information is examined, the elementary teaching is f= 48, science teacher f= 43 and social studies teacher f= 39. When the sentences containing the misconceptions were considered, it was determined that the most social studies education was f= 4, then the

science teacher f= 2 and the elementary teacher f= 1. The following are sentences for the concept of environmental ethics of teacher candidates who study in different programs.

For example;

"Environmental ethics is the ethics of nature." (Elementary school teaching - Misconceptions)

"*Environment is the future of people"* (Elementary school teaching - Non-scientific information)

"In the environment, we live in, responsibility and sensitivity are the manifestation of ethical behavior in the environment" (Social studies teaching - Scientific information)

"*We are respectful to the environment, and it is of great importance that we protect it not only for animals but for the survival of future generations*" Social studies teaching - Non-scientific information)

"Nature is the environment where people live. Our people should be respectful and sensitive." (Social studies teaching - Misconceptions)

"*For the next generations, we must keep the circle clean and tidy*." (Science teaching - Non-scientific information)

"*Environmental ethics is a person's ability to empathize with the environment, in addition to fulfilling their ethical responsibilities such as respect and affection*." (Science teaching - Scientific information)

"*We are responsible for nature (environment). The higher our moral values, the more respectful we are to nature and the future generations."* (Science teaching - Misconceptions)

CONCLUSION and DISCUSSION

This research was carried out to reveal the cognitive structure of the environmental ethics concept of the teacher candidates who have been in different programs to contribute to the field writing in relation to the concept of environmental ethics. In the study, it was determined that the candidates of teachers who studied in different programs produced a total of 726 words concerning the concept of environmental ethics. Bahar et al. (2006) The number of words associated with any concept in Word association tests can be used to determine if that concept is cognitively comprehending, whereas a concept that isn't associated with any word stated that the students would not make any sense. When the number of words produced by the teacher candidates is examined, science and elementary teaching are 250; The teacher candidates for social studies teaching program are determined to provide 226 words. Accordingly, the teacher candidates for science and elementary teaching programs have almost the same number of cognitive structures in relation to the concept of environmental ethics, whereas the teachers of social studies teaching program are less. However, the number, variety, and quality of the words produced are important in terms of revealing whether the concept is understood (Bahar et al. 2006). As a result of the research, it was determined that the prospective teachers related the cognitive structures to the words of *respect*, *cleanliness*, *morality*, and *sensitivity* most about the concept of environmental ethics. The ethical concept in the field article is to question what rules or social responsibilities should be in determining the behavior of an individual (Ertan, 1998). According to this, teacher candidates relate to the concept of

environmental ethics in their cognitive structures with words such as respect, cleanliness, morality, and sensitivity they relate to the responsibilities of the individual to the environment or in their cognitive structures they can be said to be configured. The sense of love that causes a careful, attentive, respectful attitude towards a person and thing, morality is defined as the behavior or rules of the individuals within a community, and sensitivity is sensitive and sensitive (TDK, 2017). Therefore, it can be said that the teacher candidates relate the concept of environmental ethics to concepts such as social duties or responsibilities.

When the semantic proximity of the words that the teacher candidates produce in relation to the concept of environmental ethics is assessed the highest, "respect" of teacher candidates in the elementary teacher program, the "sensitivity" of teacher candidates in the social studies teacher program and the science department is determined to associate with "cleanliness" words. In the study, it was determined that the teacher candidates produced new words such as human, nature, conservation, and consciousness in their cognitive structures in the 20-29 word cutting point range for the concept of environmental ethics.

In the study, it was determined that the prospective teachers stated new words such as *human, nature, protection*, and *consciousness* in the cognitive structures related to the concept of environmental ethics in the between 20- 29-word cutoff. In this case, it can be said that the teacher candidates constitute the concept of environmental ethics in cognitive structures in the form of human and nature protection. Again, it has been determined that the teacher candidates participating in the research relate the concept of environmental ethics to the concept of human before the concept of living. According to this, teacher candidates perceive environmental ethics as being related to human rather than living. In the study, the words of teacher candidates for the concept of environmental ethics in the cutting range of 15-19 words are examined, the words of tree, future, responsibility, life, and love; as to 10-14 words in the cutting range live, life, order, happiness, and natural resources are associated with the words are determined.

According to the programs of teacher candidates, the concept of environmental ethics is evaluated according to the frequencies; It is determined that the candidates who are educated in the social studies and elementary teaching program are associated with abstract words, and the candidates of science teachers associate them with more concrete words. In the study conducted by Karatekin & Aksoy (2012), social studies have indicated that teacher candidates have high sensory tendencies towards the environment. The concept of environmental ethics, especially by social studies candidates, is often associated with abstract concepts and supports the above explanation. When the sentences of the teacher candidates in different programs are examined in terms of the concept of environmental ethics, they are determined to establish sentences containing a vast number of superficial non-scientific information. However, it has been found that the candidates of teachers who study in the elementary school, science and social studies programs have the misconceptions about environmental ethics. In the study, the term frequency of the teacher candidates with scientific knowledge about the concept of environmental ethics is evaluated, social Information and science teacher candidates are inadequate, and the candidates of the elementary teachers have never is remarkable. Although the number of sentences containing

non-scientific information is expected to be minimal, almost every program is found to be at a high level. The concept of environmental ethics, which includes misconceptions, is the most social studies, while the least concept-illusion is determined to be in elementary school teaching. The information that doesn't correspond to the scientific truth and that prevents the teaching of the concept is stated as a misconception, according to Yürük, Cakir & Geban (2000). Word association tests are used to identify concept illusions. Besides, Ercan and Taşdere (2010) don't make a meaningful sentence for the key concepts in word association tests or leave the form blank; this is a finding that the fundamental concepts are not learned in a conceptual level in the cognitive structure of students in a meaningful way.

As a result, teachers who study in different programs have determined that their cognitive structure concerning the concept of environmental ethics is structured in their minds with different words. Also, it is determined that the prospective teachers generally have superficial knowledge associated with the concept of environmental ethics. Accordingly, researchers working on the cognitive structure of the concept of environmental ethics may be advised to work in a larger sample with different measuring tools except for word association tests.

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