DOI: 10.34056/aujef.1290208

Activities and Opinions of Science Teacher Candidates on Ecological Citizenship[1]

Fen Bilgisi Öğretmen Adaylarının Ekolojik Vatandaşlık Hakkındaki Faaliyet ve Görüşleri

Gamze KOCA[2], Elif Omca ÇOBANOĞLU[3]

Article Type[4]: Research Article

Application Date: 30.04.2023 **Accepted Date:** 24.07.2024

To Cite This Article: Koca, G. & Çobanoğlu, E. O. (2024). Activities and opinions of science teacher candidates on ecological citizenship. *Anadolu University Journal of Education Faculty* (AUJEF), *8*(3), 1000-1024.

ABSTRACT: Teachers undertake important tasks regarding awareness of the environment and raising ecological citizens. In particular, science courses include ecological issues, and science teachers are more responsible for being practitioners of these courses. The purpose of this study is to determine pre-service science teachers' views on ecological citizenship, rights of nature, ecological constitution, participation, responsibility, sustainability, rights and justice, which are the features of ecological citizenship. In line with this purpose, the study uses phenomenological design, which is a qualitative research method. The study group of the research is composed of 21 science teacher candidates, except for senior year students, attending the education faculty of a state university in a large city in the Black Sea region in 2020-2021 academic year. Descriptive analysis method was used in the analysis of the interviews. According to the findings of the study, science teacher candidates thought individuals must first be aware of nature rights and their responsibilities to nature in order to qualify as ecological citizens. It was found that teachers thought all the creatures living in nature, just like humans, have the right to live. They also thought that the protection of nature should be secured by certain laws and rules. In this respect, environmental education programs applied from pre-school to university are recommended to be reexamined in terms of ecological citizenship.

Keywords: Science teacher candidates, ecological citizenship, rights of nature, the ecological constitution, phenomenology

[1]This study was prepared on the basis of the master's thesis titled Science Teachers and Ecological Citizenship: Activities and Opinions, which we completed in August 2021 under the supervision of Associate Professor Elif Omca ÇOBANOĞLU

[2]Teacher, Ondokuz Mayıs University, Department of Mathematics and Science, Samsun, gamzekoca271@gmail.com, ORCID: 0000-0002-5348-7647

[3]Assoc. Prof. Dr., Ondokuz Mayıs University, Department of Mathematics and Science, Samsun, eomca@omu.edu.tr, ORCID: 0000-0002-3691-8273

[4]This study was carried out with the Ethics Committee Approval of Ondokuz Mayıs University dated 23.06.2020 and numbered 2020-340.

ÖZ: Çevreye karşı farkındalık kazandırılması ve ekolojik vatandaş yetiştirilmesi açılarından öğretmenlere önemli görevler düşmektedir. Özellikle fen bilgisi dersleri ekolojik konuları barındırdığından fen bilgisi öğretmenleri bu derslerin uygulayıcısı pozisyonunda oluşlarıyla daha fazla sorumluluk taşımaktadır. Bu çalışmanın amacı fen bilgisi öğretmen adaylarının ekolojik vatandaşlık kavramı, tabiatın hakları, ekolojik anayasa ve ekolojik vatandaşlık özelliklerden olan katılım, sorumluluk, sürdürülebilirlik, hak ve adalet hakkındaki görüşlerini belirlemektir. Bu amaç doğrultusunda çalışmada nitel araştırma yönteminden olgubilim deseni kullanılmıştır. Araştırmanın çalışma grubunu 2020-2021 eğitim-öğretim yılında Karadeniz Bölgesinde bir büyükşehirdeki devlet üniversitesinin eğitim fakültesinde son sınıf hariç öğrenim gören 21 fen bilgisi öğretmen adayı oluşturmaktadır. Görüşmelerin analizinde betimsel analizi yöntemi kullanılmıştır. Araştırmanın bulgularına göre fen bilgisi öğretmeni adaylarının, bireylerin ekolojik vatandaş olarak nitelendirilebilmesi için öncelikle tabiat haklarının ve doğaya karşı sorumluluklarının bilincinde olmaları gerektiği görüşünde oldukları belirlenmiştir. Öğretmen adaylarının doğada yaşayan tüm varlıkların tıpkı insanlarda olduğu gibi yaşam hakkının olduğunu düşündükleri bulunmuştur. Ayrıca öğretmen adayları doğanın korunmasının belli kanun ve kurallarla güvence altına alınması gerektiğini düşünmektedirler. Bu sonuçlardan hareketle okul öncesinden üniversiteye kadar uygulanan çevre eğitim programlarının, ekolojik vatandaşlık açısından tekrar ele alınması önerebilmektedir. Ayrıca gelecekteki araştırmalar kapsamlı bir ekolojik vatandaşlık ölçeği hazırlayabilir ve niceliksel bir çalışma gerçekleştirebilir.

Anahtar sözcükler: Fen Bilgisi öğretmen adayları, ekolojik vatandaşlık, tabiatın hakları, ekolojik anayasa, olgu bilim

1. INTRODUCTION

Humans live in an ecosystem called the environment, with all other living and non-living beings. The environment is a place where living and non-living beings interact and the most important role in this interaction belongs to humans (Teksoz, Şahin & Ertepinar, 2010). The environment, which includes all economic, cultural and natural judgments, is considered the whole of biological, physical, chemical and social values affecting the movement of the living and non-living beings (Cansaran & Yıldırım, 2017, p. 1). The environment must be balanced so that it can provide a suitable environment for all living things it hosts. The deterioration of ecological balance negatively affects the lives and quality of life of living things, including humans. Human activities have a critical role in maintaining the balance of the environment. It is known that some conscious or unconscious activities of humans cause pollution and disrupt ecological balance (Bozkurt & Koray, 2002, p. 67). Since the deterioration of ecological balance by humans will eventually affect humans in the ecosystem where interactivity is fundamentalit is a must for humans to take actions that will be sensitive to the environment and maintain ecological balance (Morgil, Yılmaz & Cingöl, 2002).

The ecological balance of the environment and the continuability of this balance are vital issues. The balance of the environment in the last two centuries has deteriorated more than ever by human hands due to the rapid development of industrial momentum and subsequent industrial technology, rapid urbanization and population growth. Factors such as the two world wars and the subsequent nuclear armaments in the Cold War process have accelerated the destabilization of the environment. All of these factors have led humanity to the implementation of a new concept of sustainability. In recent years, the proliferation of environmental problems and the importance of the concept of sustainability have begun to be increasingly understood (Barry, 2006). The use of the existing resources without exceeding the renewal limits is the purpose of a sustainable environment. Within the framework of sustainability, environmental conditions and ecological conditions are evaluated over a long period, and development plans are prepared to prevent resources from becoming unsustainable (Gündüz, 2004, pp. 58-60). A series of processes ranging from the protection and continuity of the sustainable environment, initiative plans, projects for renewable energy sources, environmental institutions and organizations to becoming an ecological citizen constitute the foundations of the sustainable environment.

Environmental Protection is defined as “all work carried out to prevent environmental pollution, to prevent environmental factors and ecological balance from being changed, deteriorated and destroyed, and to improve the environment” in the 1983 Environmental Law, which is our national legislation. It is known that the idea of protecting the environment was put forward at the Stockholm Conference in the late 1700s. The declaration issued at the end of the Stockholm Conference included environmental rights, protection of the environment for future generations, and the necessity of environmental education (Keles, Metin & Sancak, 2005). However, sensitivity to the environment and environmental issues emerged after the World Wars I and II and due to the destructions caused by the wars, and the efforts to protect the environment started to a large extent. Today, with environmental problems increasing for different reasons, governments are working at both national and international levels to protect the environment and solve environmental problems, civil society organizations are conducting various activities, and citizens have more information and knowledge about the environment.

In the present day, when the alarm bells are ringing for environmental problems, in order to solve the existing problems and prevent the emergence of new problems, there is a need to raise individuals who are aware of the existence of environmental problems, who can take action to solve these problems, and who are aware that natural resources can be exhausted (Johnson & Mappin, 2005, p. 52; Palmer &

Neal, 1996, p. 49). This relational structure between the environment and human is not simple enough to be regulated only by the laws that have been removed and by a number of rules that have been brought in. It is very important that the people who make up the most important part of the environmental phenomenon are responsible, conscious, and act accordingly and respect the environment (Karaismailoğlu, 2018, p. 18). It has been emphasized that in order to reduce, slow down or even completely eliminate the effects of environmental problems that threaten the future of humanity and all life on earth, it is necessary to have ecological citizens who can exhibit desired behaviors towards the environment (Erten, 2012, p. 88).

The concept of traditional citizenship can be used to mean being a member of a state or political society. In this context, traditional citizenship refers to institutions and practices that constitute mutual rights and responsibilities between the state and individuals. These traditional conceptualizations between society and the state are increasingly losing their impact on dealing with today's world problems (Beck, 2003, p. 458). To solve global ecological crises, an understanding beyond traditional citizenship is needed. The question "What kind of citizenship?" comes to mind to fight the ecological crises of our day. This is also widely reflected in theoretical discussions that begin to explore links between citizenship and the environment. The concept of citizenship is covered in three different ways (Özdemir Özden, 2011, p. 27): The first is the creation of the understanding of the rights of especially the citizens, with environmental concerns. Secondly, the advanced level of global consciousness combined with ecological thinking has begun to expand the boundaries of citizenship. The third is the new responsibilities to citizenship, along with the ecological concerns arising. In the context of these discussions, the idea of ecological citizenship, which complements the rights based on environmental justice, as well as the responsibilities of the public sector and the individual area with the identity of citizenship, emerges (Özdemir Özden, 2011, p. 27).

Ecological citizenship is a concept that envisages that all living things (humans, animal, trees, soil, etc.) in nature have rights, beyond the discussions of locality-globality and individuality-sociality, and that it is necessary to strive to protect these rights (Dobson, 2003). Ecological citizenship is defined as "a citizen who knows his/her rights and responsibilities towards everyone in the ecosystem and approaches everyone with justice, shows participatory behavior towards environmental problems, and can control his/her footprints for a sustainable life" (Karatekin & Uysal, 2018). The idea of ecological citizenship offers a new world to people as an enhancement to the values destroyed against nature for humans and other creatures found in nature, and citizens accompanying the establishment of this new world are described as ecological citizens (Horton, 2005, p. 136). Ecological citizenship has different dimensions and components. These elements determine the perspective of individuals and societies on environmental problems and their search for solutions to these problems (Dobson, 2003; Seyfang, 2006).

Ecological citizenship has four dimensions: responsibility, rights and justice, participation and sustainability. The dimension of responsibility assumes that responsible ecological citizens are adopted as a basic principle in ensuring the protection and continuity of biodiversity and ecosystem and that their attitude and behavior are developed to focus on protecting the environment and solving environmental problems (Mengi & Algan, 2003, p. 48; Uysal, 2018). It is considered that responsible behavior will increase the chances of life for people and many living things in nature against the negative effects of economic growth and technology (Dobson, 2003, p. 82). The dimension of rights and justice advocates an understanding that includes reinterpretation of justice in terms of the environment and giving their right to the environment, not just to the environment where people are, but to the environment where all living things are (Uysal, 2018). Ecological citizenship is possible by acquiring elements such as

knowledge and awareness, ethics and values, participation and action, sustainable consumption and production (Seyfang, 2006; Latta & Garside, 2005). Ecological citizens perceive environmental rights and justice as a whole, and value the environmental problems around the world equally and assess equally in terms of rights and justice (Horton, 2005, p. 143). They treat environmental problems anywhere as the environmental problem of the world, not only of that place (Kılıç & Tok, 2014). Ecological citizenship is built on environmental ethics and values (Latta & Garside, 2005). This includes respecting nature and other living things, embracing sustainable living, and advocating for environmental justice (MacGregor, 2006). The participation dimension envisages that individuals act not only on certain prohibitions to avoid polluting the environment but on an active basis for environmental actions (Keles et al., 2005, p. 59; Yıkılmaz, 2004). At the heart of their actions, there is a goal to create an environmental-centric society that changes the policies that exploit the environment (Yaylacı, 2012, p. 32). Finally, the dimension of sustainability envisages meeting individual needs in a way that will allow meeting the needs of future generations, taking into account social responsibility, social justice, environmental management, stakeholder management and ethical values (Kılıçoğlu, 2005, p. 65; Mengi & Algan, 2003, p. 54). Ecological citizens are aware that in a world where resources are limited, people's desire to consume without limits increases environmental problems (Gündüz, 2004, p. 69). Ecological citizen aims to transfer the environmental conditions to future generations, free of their problems.

In addition to its dimensions, ecological citizenship also has components. It is possible to gain ecological citizenship through gaining these components (Dobson &Andrew 2003). In addition, when environmental training is given, environmental knowledge and awareness increase (Deniş & Genç, 2007; Keleş, Uzun & Varnaci, 2010). These components are ecological knowledge, ecological consciousness, ecological concern, personality changes, ecology training, ecological information, ecology literacy and ecologically responsible behavior (Hawthorne & Alabaster, 1999, p. 27). Environmental information needs to be obtained adequately and up to date from reliable sources. Environmental awareness requires knowing environmental issues with their causes and effects and a positive attitude towards the elimination of environmental problems (Jagers et al., 2009, p. 23). Ecological concern is the concerns that are felt about the consequences of environmental problems. The personality change component of ecological citizenship envisages that some personality traits of individuals who have gained knowledge and awareness about the environment and are concerned about environmental problems will change. At this stage, ecological citizens will have developed a new attitude toward the environment and environmental problems, realizing that they can do something to address environmental problems, they will recognize that they have individual and social responsibilities about the environment, develop a sensitivity to the environment and environmental issues, and they can give up their own economic interests in the protection of the environment. Ecology education will accelerate the acquisition of ecological citizenship as awareness, knowledge, attitude, skill, adoption, and motivation are associated with environmental movements (Hawthorne & Alabaster, 1999, p. 32). Ecological information component is related to environmentally responsible behavior and anticipates a strong link between abstract or tangible information and environmental behavior (Jagers et al., 2009, p. 26). The ecology literacy component requires basic functional training in relation to individual self-awareness and environmental awareness, providing the motivation, skills and knowledge needed to cope with environmental needs (Jagers et al., 2009, p. 26). The final component of ecological citizenship is ecologically responsible behavior and is a positive approach to solving problems, respect for democracy and participation in the process, as well as not only understanding and assessing the system but also acting to make it better (Hawthorne & Alabaster, 1999, p. 33).

Ecological citizenship is promising for the protection of the environment and the solution to environmental problems. Spreading ecological citizenship awareness will be an important step in solving environmental problems (Seyfang, 2006). However, it is possible to gain the components of ecological citizenship through environmental training (Erten, 2012, p. 88). Environmental education is a learning area that aims to educate environmentally conscious individuals who gain a sense of morality and consumption in society, who only consume as much as they need, who are sensitive to environmental problems, who feel responsible for protecting nature against future generations, and who can act environmentally responsible (Öztürk, 2013, p. 30). Environmental training is the development of knowledge, attitude, value judgments and skills needed to protect the environment so that environmental behavior is demonstrated and their results are seen (Erten, 2004, p. 21; Sanera & Shaw, 1999, p. 36). Environmental education aims to grasp the natural environment of people, the components that make up the environment and the relationships between them, to raise well-informed individuals, who know how to live in harmony with nature and who are active and responsible for the environment (Genç & Karabal, 2016, p. 19). Environmental education is considered valuable in making individuals more susceptible to the causes and effects of long-standing environmental problems or unrealized environmental issues (Palmer & Neal, 1996, p. 68). In addition, environmental education is crucial to solving the environmental problems that are occuring (Erten, 2004, p. 21).

Environmental education has a strong background in shaping natural studies, natural experiences and environmental science studies (Kyburz Graber, 1999, p. 62). Since 1960, the deterioration of the environmental structure and quality has helped to formally include environmental education. The prevalence of environmental education in the globalized world is rapidly increasing and the importance of education is becoming apparent (Alım, 2006). With the increasing importance of environmental education, environmental issues have been given weight in education programs. In comparison to other disciplines, especially science educators take responsibility for providing environmental education since environmental issues are related to natural events and environmental problems are measured by technological and biological indicators (Duvall & Zint, 2007, p. 88; Kyburz Graber, 1999, p. 102).

It is important for teacher training institutions to train candidates with sufficient equipment in environmental education and to prepare more qualified environmental education programs in the future (Tuncer et al., 2009, p. 426). To raise individuals with ecological citizenship qualifications, teachers must have these qualifications and be equipped with practical capabilities. Although important tasks and responsibilities have been reduced to teachers in environmental education, environmental education has not been institutionalized, environmental education has not been systematically made and teacher candidates have not achieved sufficient qualifications in teacher-educating institutions and teacher-training programs (McKeown Ice, 2000, p. 4). In Turkey, there is no environmental education policy adopted regarding higher education, and although deficiencies are tried to be corrected, there are still insufficient environmental education courses in universities (Kaypak, 2013, p. 66). There is research showing that university students do not have sufficient knowledge of environmental issues and do not adequately recognize ecological problems (Erdal, Erdal & Yucel, 2013; Yılmaz et al., 2002), and there are also studies that show that primary schools do not have the desired environmental education sensitivity (Şimşekli, 2004) and research which shows that high school students do not have enough environmental education (Aydın & Kaya, 2011). In a study examining science and technology teachers' information levels for the environment, it was determined that science and technology teachers did not have adequate environmental training in the higher education process, and that most of them had a moderate level of knowledge, and that there were very few teachers with sufficient environmental knowledge (Aydemir, 2007). Positive findings have also been obtained, indicating that preschoolers have

sufficient information and attitudes toward the environment (Erten, 2005). In another study, it has been found that teacher candidates have a high sense of the environment, and the levels of science teacher candidates are higher than those of primary school teacher candidates and social studies teacher candidates.

In addition, research shows that when environmental training is given, environmental knowledge and awareness is increased. In a study comparing teacher candidates who took an environmental knowledge course and those who did not take it, it was found that teacher candidates who took an environmental knowledge course had significantly higher knowledge than those who did not receive environmental information, but that their attitude for the environment was not significantly different (Deniş & Genç, 2007). In another study, nature education was found to positively affect the environmental awareness and environmental attitudes of teachers (Keleş, Uzun & Varnaci, 2010).

Higher education institutions play the role of providing educational elements that educate the experts of societies. Higher education institutions must inform their students of their professional field information and professional skills, as well as their knowledge of ecological citizenship, sustainable environment and sustainable development. The biggest obstacle to achieving the expected point in the implementation of environmental education at the higher education level is that environmental issues are interdisciplinary and therefore different teaching approaches are needed outside of the ordinary. There is a recommendation for experts from different disciplines to cooperate the courses in the environment education process (Öztürk, 2013, p. 28).

Schools are the best place to provide environmental education in a common and formal way. Students at all levels of schools can be trained in the environment and can be raised by environmentally conscious and environmentally protected individuals. At this point, one of the most important responsibilities falls to teachers. It is known that being able to cope with environmental problems and to leave a habitable nature legacy for future generations and to raise them as individuals who can continue their lives as ecological citizens are among the most important tasks and responsibilities of our teachers. Therefore, teachers should be good environmental educators before anyone else. It is thought that good environmental educators should be eco-citizens who are sensitive, responsible, and have sufficient knowledge and consciousness in the face of environmental problems. Science teachers' candidates have an important place in raising individuals who will become ecological citizens in line with these requirements (Koca, 2021).

Not enough work has been conducted on science teachers who have a very important role in protecting the environment and raising environmentally responsible citizens. Teachers' perceptions about the environment, sustainability of the environment, environmental responsibilities and their approach to what needs to be done have not been sufficiently examined. The number of qualitative studies in this area is limited. This qualitative research was conducted to determine the activities and views of science teacher candidates about the concept of ecological citizenship, the rights of nature, ecological constitution, and participation, responsibility, sustainability, rights and justice, which are the characteristics of ecological citizenship, to make a contribution to fill this gap in the literature.

2. METHOD

The present research is a qualitative study aimed at determining the opinion of teachers on ecological citizenship. This study uses the phenomenological (phenomenology) design of qualitative research methods. Phenomenology focuses on cases that individuals are aware of but do not have a deep and detailed understanding of. The purpose of phenomenological studies is to reveal and interpret individual perceptions about a phenomenon (Yıldırım & Şimsek, 2011). Phenomenological design was preferred in the study as it is important to reveal the perception and interpretation of individuals in the study.

2.1. Participants

The study group of the research was formed by 21 science teacher candidates who studied at the education faculty of a state university, except for senior year students, in a large city in the Black Sea region in the 2020-2021 academic year. The data were collected using a semi-structured interview form. The interview form was thoroughly scanned and created by the researcher in accordance with the purpose of the study. A pilot study was conducted with 5 teachers to increase the validity and reliability of the research. In the pilot study, the understandability of the questions in the interview form and the purpose of the study were tested. The pilot study also assessed the suitability of the interview times. After the pilot study, four separate expert views were the interview form was given its final form. The form, which was prepared by taking expert opinion, was finalized by adding 3 questions. What do you think ecological citizenship is? Can you describe it? What kind of work do you do regarding the environment and environmental problems? It includes interview questions consisting of 7 questions.

2.2. Data Collection Tool

Official permissions for data collection have been obtained. Data were collected only from volunteers. Prior to the interview, each participant was informed that they would be recorded and their approval was received. The answers given by science teacher candidates to the questions on the interview form were recorded with the voice recorder. The research data was collected at the appropriate time of teacher candidates who participated in the study and through online one-on-one interviews due to Covid-19 epidemic disease. The interviews were completed in an average of 20 to 25 minutes.

2.3. Data Analysis

The study uses descriptive analysis technique to analyze the data. In descriptive analysis, the data were organized according to themes, categories and codes, respectively, according to the steps determined by the method of Yıldırım and Simsek (2011).

A number of techniques have been used to improve the reliability of the findings. Firstly, the separation and coding of the data obtained for the themes were controlled by two experts. Secondly, the findings obtained and how they were obtained were reported in detail. Third, the agreement percentage of the findings was calculated. The agreement percentage was calculated using the formula “reliability = consensus / (Agreement + Disagreement) x 100” (Miles & Huberman, 1994). In the study, the agreement percentage in the coding through this formula was calculated as 0.88 for the first question,

0.86 for the second question, 0.88 for the third question, 0.89 for the fourth, fifth and sixth question, and 0.87 for the seventh question and 0.88 for all questions in total.

3. RESULTS

3.1. Teacher Candidates' Views on the Concept of Ecological Citizenship

Table 1 below includes the analysis of the answers to the question "What do you think is ecological citizenship? Can you describe it?" asked within the scope of determining the views of teacher candidates about ecological citizenship.

Table 1: *Results on the Concept of Ecological Citizenship*

Ecological citizenship category	**f**
Theme 1: Being aware of rights and responsibilities	
Code 1: Respect for the rights of nature or the environment	4
Code 2: Protecting the rights of nature or the environment	9
Code 3: Sensitivity for nature or environment	8
Code 4: Awareness of responsibilities	7
Theme 2: Fair approach	
Code 1: Sense of justice	1
Theme 3: Showing participant behavior	
Code 1: Active role in nature and the environment	4
Theme 4: Sustainability	
Code 1: The idea of future	3

According to the findings in Table 1, the answers given by 21 participants on the ecological citizenship concept were collected under 4 different themes in the ecological citizenship category and 7 codes related to these themes. The highest number of answers was in the theme of being aware of rights and responsibilities The lowest number of answers was in the theme of fair approach. Examples of the answers provided are provided below.

Theme 1, Code 1: "Ecological citizenship is protecting nature, respecting nature's rights, and applying it in life. It's a responsibility to nature that gives us perfect beauty. Every human owes to nature, we can pay it by protecting nature, not harming it". (S3)

Theme 1, Code 2: "They are responsible individuals who are sensitive to their environment, who know and advocate not only their rights but also nature's rights". (S10)

Theme 1, Code 3: "I think they are environmentally conscious people who know environmental rules and who apply these". (S7)

Theme 1, Code 4: "Ecological citizen is a person who knows their responsibilities to nature and lives according to it. For example, if a person knows that waste batteries can cause serious damage to the environment and throws their batteries into the waste battery box or uses the geographical characteristics of their lives in the environment and their own interest, they are ecological citizens". (S8)

Theme 2, Code 1: "Ecological citizens are citizens who protect the rights of nature as their own rights. They take responsibility for that. They play an active role and act with the sense of justice to protect the world we live in and take it to the future". (S11)

Theme 3, Code 1: "Ecological citizen is a person who knows their responsibilities to nature and lives according to it. For example, if a person knows that waste batteries can cause serious damage to the environment and throws their batteries into the waste battery box or uses the geographical characteristics of their lives in the environment and in their own interest, they are ecological citizens". (S8)

Theme 4, Code 1: "Let me tell you that since ecology is ultimately interacting with the living and non-living environment, living beings have a responsibility to the environment and nothing is human-centered. I would say it's an environmentally conscious individual who accepts the planet that he lives on as a whole and wants to keep it going." (S15)

3.2. Views of Teacher Candidates on the Features of Ecological Citizens (Participation, Responsibility, Sustainability, Rights and Justice)

In this part of the study, the results of the answers given to questions "What kind of activities do you do for the environment and environmental issues? Do you feel any responsibility for the environment and environmental issues? If yes, what kind of responsibilities do you have? If not, why? What do you pay attention to for a sustainable future? What do you pay attention to in the name of rights and justice for environmental and environmental issues?" asked to participants to find out their views on the features of being an ecological citizen (participation, responsibility, sustainability, rights, and justice) are presented in tables.

Table 2: *Results on Participation Feature of Ecological Citizenship*

Category of participation in ecological citizenship	**f**
Theme 1: Participation	
Code 1: Online or social media participation	12
Code 2: Participation through civil society organizations	16
Code 3: Participation through individual activities	6
Code 4: Participation in friend circle	1

According to the findings in Table 2, the category of participation in ecological citizenship was formed within the scope of responses to activities against environmental and environmental problems by 21 participants. The category includes 1 theme and 4 codes associated with this theme. The highest number of answers were given in the online and social media participation and participation through NGO codes. The lowest number of answers were given in the participation with the friend circle code. Examples of the answers given are shown below.

Theme 1, Code 1: "I am a member of the TEMA Foundation and I follow and participate in the activities there. I participate in campaigns on social media. Even if I don't participate in it myself, I provide financial assistance for forestation." (S16)

Theme 1, Code 2: "Previously, I was involved in many projects in my education life. These projects were about protecting the environment. I am also careful not to be indifferent to the aid campaigns that are collected in booths in malls. I also served in clubs at my school". (S5)

Theme 1, Code 3: "I follow and participate in the works of units that make these kinds of practices from social media as appropriate. I volunteer during the cleaning days, enjoy taking part in works like planting a tree, work in the garden in our own private home and take care of them one-on-one". (O13)

Theme 1, Code 4: "In high school, my friends and I campaigned for nature. The purpose of the campaign was to take the money we collected from the people and plant trees in nature in their name. (O3)

Secondly, the results found from the answers to the questions "Do you feel any responsibility towards the environment and environmental problems? If yes, what responsibilities do you have? If no, why?" asked within the scope of determining the views of the teacher candidates about the characteristics of being an ecological citizen are shown in Table 3.

Table 3: *Results on Responsibility Feature of Ecological Citizenship*

Category of responsibility in ecological citizenship	**f**
Theme 1: Responsibility	
Code 1: Animal responsibilities	11
Code 2: Environmental responsibilities	21

According to the findings in Table 3, the responsibility category in ecological citizenship was created within the scope of the answers given by 21 participants regarding environmental problems. The category includes 1 theme and 2 codes associated with this theme. It is seen that all participants answered as responsibility for the environment, and half answered as responsibility for animals. Examples of the answers given are shown below.

Theme 1, Code 1: "Yes. If I see a street animal, I'll give a pot of water and food. I walk around national parks to get to know nature better. I report those who torture animals. I try to make a list of needs before I shop". (S14)

Theme 1, Code 2: "Of course, I feel responsible like everyone else. As an educated individual, I hold trash until I find a suitable place to throw it. Starting with my immediate surroundings, I warn others to do the same. I have no patience for people who spit on the ground in the middle of the street, and even if I thought it would cause a problem, I wouldn't go without saying it. We are trying to seek justice as much as we can in our own way." (S13)

Thirdly, in Table 4, the results found from the answers to the questions "What do you pay attention to for a sustainable future?" asked within the scope of determining the views of the teacher candidates about the characteristics of being an ecological citizen are shown in Table 4.

Table 4: *Results on Sustainability Feature of Ecological Citizenship*

Category of sustainability in ecological citizenship	**f**
Theme 1: Sustainability	
Code 1: Sustainability in terms of natural resources	15
Code 2: Sustainability in terms of recycling	6
Code 3: Sustainability for nature and living beings in nature	6

According to the findings in Table 4, the sustainability category of ecological citizenship was established within the scope of the responses 21 participants gave to what they paid attention to for a sustainable future. It is seen that 1 different theme and 3 codes related to these themes are under this category. The highest number of answers are shown in sustainability codes. In addition, it was found that there were equal numbers of recycling and sustainability, sustainability for nature, and living beings in nature codes. Examples of the answers given are shown below.

Theme 1, Code 1: "The continuity of production and diversity is ensured and the survival of humanity can be maintained. In other words, sustainability means that we can meet our own needs without compromising on the needs of future generations. Therefore, I pay attention to waste separation, water consumption, and electricity consumption". (S11)

Theme 1, Code 2: "I think that if we want our future to be healthy and clean, we should simply separate the waste. I'm careful about recycling. We should be careful not to use materials such as plastic bags, and plastic bottles, which are lost late in nature". (S2)

Theme 1, Code 3: "As mentioned in the above article, I try not to do any harm to the environment. Because we know that we live in an environment that allows us to meet all our needs, I mean in nature. I think that living comfortably is proportional to protecting where we live. That's why I'm trying to protect it from pollution and harm. If everyone does what they should do, there'll be no problem. We must learn to live with nature, not fight with it." (S5)

Fourthly, in Table 5, the results found from the answers to the question "What do you pay attention to in the name of rights and justice for environmental and environmental issues?" asked within the scope of determining the views of the teacher candidates about the characteristics of being an ecological citizen are shown in Table 4.

Table 5: *Results on Rights and Justice Feature of Ecological Citizenship*

Category of rights and justice in ecological citizenship	**f**
Theme 1: Rights and justice theme	
Code 1: Sadness and concern for the environment and environmental problems	9
Code 2: Sense of right and justice for the environment and environmental problems	8
Code 3: Those who have no feelings or thoughts about rights and justice	3

According to the findings in Table 5, the category of rights and justice in ecological citizenship was formed within the scope of responses of 21 participants to the rights and justice of the environment and environmental problems. The category includes 1 theme and 3 codes associated with this theme. Participants were shown to have the most sympathy for environmental and environmental issues --

concern and compliance with rules, rights, and justice for environmental and environmental issues. In addition, there was also a response from those who do not have feelings and opinions for rights and justice. Examples of the answers given are shown below.

Theme 1, Code 1: "I feel sorry for the city the thermal power plant is in. Forest fires hurt me no matter where they occur. We must defend the rights of the lives there and ask our sense of justice for it". (S1)

Theme 1, Code 2: "The world belongs to all of us, living things belong to all of us, nature belongs to all of us. The sky belongs to all of us although the effects of the Hiroshima bomb are still not disposed of in our country. I follow the agenda. I claim my rights". (S19)

Theme 1, Code 3: "I don't know much about this". (S14)

3.3. Teacher Candidates' Opinions On Nature's Rights

In Table 6 below, the results found from the answers to the question "Do you think nature has rights? If so, can you tell me what these rights could be?" asked within the scope of determining the views of the teacher candidates about the rights of nature are shown.

Table 6: *Findings on the Rights of Nature*

Nature's rights category	**f**
Theme 1: Right to live	
Code 1: The right to live protected by law as humans	11
Code 2: The right to live and take shelter freely	3
Theme 2: Right for sustainability	
Code 1: The right to continue their generation	4
Theme 3: Right to be protected	
Code 1: The right to be protected by law, like humans	5
Code 2: The right to not pollute nature or its environment	2
Code 3: The right to not harm nature or the environment	4
Theme 4: Right of respect and value	
Code 1: The right to respect or value the environment and nature	2
Code 2: The right to respect or value living things	2

According to the findings in Table 6, it is observed that the answers of 21 participants to the question "Do you think nature has rights? If so, can you tell me what these rights could be?" are collected under 4 different themes and 8 codes related to these themes. The highest number of answers was given on the theme of the right to live and the right to be protected. The lowest number of answers was given on the theme of respect or value. Examples of the answers given are shown below.

Theme 1, Code 1: "Of course it does. Just because we can express ourselves verbally doesn't mean we're the only living thing in the world. Nature has the right to express itself. It is the right to complete its own formation in its natural time, not to be intervened, to live". (S6)

Theme 1, Code 2: "Of course it has rights. Nature has its rights. It has the right to be protected, the right to be respected and the right to live freely". (S16)

Theme 2, Code 1: "It does". First, they may have the right to continue their own generation, to live. This is a right that we can intervene because nature cannot harm its own life." (S20)

Theme 3, Code 1: "Yes, of course it does. In the end, as human beings, nature has its rights, like we have our rights. Nature demands equilibrium. Nature wants protection and the right to live". (S15)

Theme 3, Code 2: "Of course it does, no living things in nature want to be harmed. This is a natural right. Nature has the right to live freely, as simple as it is." (S7)

Theme 3, Code 3: "Of course, no living things in nature want to be harmed. This is a natural right. Nature has the right to live freely, as simple as it is." (S 2)

Theme 4, Code 1: "Yes it does. These may be the right to live, the right to be respected, the right to be valued. Even the day of the Mother Nature Rights is remembered". (S9)

Theme 4, Code 2: "It does. It may be the right not to harm nature. It may be the right to respect any living creature". (S16)

3.4. Teacher Candidates' Views on Creating an Ecological Constitution

Table 7 shows the results found from the answers to the question "If you decided to make an ecological constitution, what would be the first 5 articles?". The participants' views on the first, second, third, fourth, and fifth articles of the ecological constitution they would have designed are given in separate tables.

Table 7 shows the results on what should be in the first article of the ecological citizenship constitution according to the participants' views.

Table 7: *Findings on the first article of The Ecological Citizenship Constitution*

The first article of the ecological constitution	**f**
Theme 1: Protection in ecological constitution	
Code 1: Prevention of destruction of nature	7
Code 2: Waste management	2
Code 3: Efficient use of natural resources	4
Theme 2: Education in the ecological constitution	
Code 1: Information awareness	4
Theme 3: Rights in ecological constitution	
Code 1: The right to equality and integrity of living things	3
Theme 4: Responsibility in the ecological constitution	
Code 1: Responsibility to nature	3
Theme 5: Those who have no of the ecological constitution article	
Code 1: Those who have no view of the ecological constitution article	1

According to the findings in Table 7, the first article category of ecological constitution was created within the scope of the answers given by 21 participants about the first item they would want to include in the constitution if they wanted to make an ecological constitution. This category is collected under 5 different themes and 7 codes associated with these themes. The highest number of answers was

given in the theme of protection in the ecological constitution, while the lowest number of answers was given in the theme of responsibility to nature. The theme of those who had no view of the ecological constitutional article was also included. Examples of the answers given are shown below.

Theme 1, Code 1: "My first article would protect the nature." (S16)

Theme 1, Code 2: "Reducing the use of plastic products". (S9)

Theme 1, Code 3: "Conscious use of resources". (S17)

Theme 2, Code 1: "More awareness of environmental science of citizens in our country". (S8)

Theme 3, Code 1: "This world is not just for people. They share it with animals and non-living beings. People shouldn't hurt nature. They should keep their environment clean, not damage living and non-living beings and act to beautify their environment". (S5)

Theme 4, Code 1: "Everyone is responsible for cleaning their own home and environment". (S7)

Theme 5, Code 1: "I don't know much about this right now". (S1)

Table 8 shows the results on what should be in the second article of the ecological citizenship constitution according to the participants' views.

Table 8: *Findings on the Second Article of The Ecological Citizenship Constitution*

The second article of the ecological constitution	**f**
Theme 1: Protection in ecological constitution	
Code 1: Prevention of destruction of nature	8
Code 2: Waste management	4
Code 3: Efficient use of natural resources	1
Theme 2: Education in the ecological constitution	
Code 1: Information awareness	3
Theme 3: Right in ecological constitution	
Code 1: Animal rights	2
Theme 4: Responsibility in the ecological constitution	
Code 1: Responsibility to nature	1
Theme 5: Punishment in the ecological constitution	
Code 1: Legal punishment against harm to nature	2
Theme 6: Those who have no views of the ecological constitution article	
Code 1: Those who have no views of the ecological constitution article	1

According to the findings in Table 8, the second article category of ecological constitution was created within the scope of the answers given by 21 participants about the second item they would want to include in the constitution if they wanted to make an ecological constitution. This category is collected under 6 different themes and 8 codes associated with these themes. The highest number of answers was given in the theme of protection in the ecological constitution, and the lowest number of answers was given in the theme of responsibility in the ecological constitution. The theme of those who had no view of the ecological constitutional article was also included. Examples of the answers given are shown below.

Theme 1, Code 1: "I would have put the right to protection of nature into the constitution". (S21)

Theme 1, Code 2: "Recycling sanctions". (S10)

Theme 1, Code 3: "Natural resources are needed and should be used sufficiently. Waste should be avoided, not used in any way to harm any living creature". (S8)

Theme 2, Code 1: "Creating more informative applications about the curriculum on environmental science for the growing new generation. For example, theater, various campaigns." (S5)

Theme 3, Code 1: "It could be a law for endangered animals". (S19)

Theme 4, Code 1: "It is a crime to touch any natural beauty, no matter what." (S4)

Theme 5, Code 1: "I don't know much about this right now". (S1)

Table 9 shows the results on what should be in the third article of the ecological citizenship constitution according to the participants' views.

Table 9: *Findings on the Third Article of The Ecological Citizenship Constitution*

The third article of the ecological constitution	**f**
Theme 1: Protection in ecological constitution	
Code 1: Prevention of destruction of nature	7
Code 2: Waste management	3
Theme 2: Education in the ecological constitution	
Code 1: Information awareness	2
Theme 3: Rights in ecological constitution	
Code 1: The right to equality and integrity of living things	2
Code 2: Animal rights	2
Theme 4: Responsibility in the ecological constitution	
Code 1: Responsibility to nature	1
Theme 5: Punishment in ecological constitution	
Code 1: Legal punishment against harm to nature	2
Theme 6: Those who have no view of the ecological constitution article	
Code 1: Those who have no view of the ecological constitution article	1

According to the findings in Table 9, the third article category of ecological constitution was created within the scope of the answers given by 21 participants about the third item they would want to include in the constitution if they wanted to make an ecological constitution. This category is collected under 6 different themes and 8 codes associated with these themes. The highest number of answers was given in the theme of protection in the ecological constitution, and the lowest number of answers was given in the theme of responsibility in the ecological constitution. The theme of those who had no view of the ecological constitutional article was also included. Examples of the answers given are shown below.

Theme 1, Code 1: "Natural beauty cannot be sold or touched under any circumstances." (S4)

Theme 1, Code 2: "Every house has to collect and recycle waste materials". (S7)

Theme 2, Code 1: "By being informed in the designated days of the year under the name of environmental protection event". (S12)

Theme 3, Code 1: "The principle of accepting nature as a whole". (S16)

Theme 3, Code 2: "The article to protect endangered animals". (S17)

Theme 4, Code 1: "Every citizen should have a duty like a nature tax, which means that they should do a useful job". (S21)

Theme 5, Code 1: "Giving lectures to people responsible for forest fire". (S10)

Theme 6, Code 1: "I don't know much about this right now". (S1)

Table 10 shows the results on what should be in the fourth article of the ecological citizenship constitution according to the participants' views.

Table 10: *Findings on the Fourth Article of The Ecological Citizenship Constitution*

The fourth article of the ecological constitution	**f**
Theme 1: Protection in ecological constitution	
Code 1: Prevention of destruction of nature	6
Code 2: Waste management	1
Code 3: Efficient use of natural resources	2
Theme 2: Education in the ecological constitution	
Code 1: Information awareness	2
Theme 3: Rights in ecological constitution	
Code 1: Animal rights	1
Theme 4: Responsibility in the ecological constitution	
Code 1: Responsibility to nature	1
Theme 5: Punishment in ecological constitution	
Code 1: Legal punishment against harm to nature	4
Theme 6: Those who have no view of the ecological constitution article	
Code 1: Those who have no view of the ecological constitution article	2

According to the findings in Table 10, the fourth article category of the ecological constitution was created within the scope of the answers given by 21 participants about the fourth item they would want to include in the constitution if they wanted to make an ecological constitution. This category includes 6 different themes and 8 codes associated with these themes. The highest number of answers was given in the theme of protection in the ecological constitution, and the lowest number of answers was given in the theme of rights and responsibility in the ecological constitution. The theme of those who had no view of the ecological constitutional article was also included. Examples of the answers given are shown below.

Theme 1, Code 1: "There should be only 1 car in each house. More public transport will be used". (S7)

Theme 1, Code 2: "Organic waste should be left in accordance with soil areas. The environment must be kept clean. Waste oil and waste batteries should be thrown into suitable recycling bins". (S8)

Theme 1, Code 3: "Conscious consumer article". (S18)

Theme 2, Code 1: "Increasing plant and seed planting and encouraging the public to do so". (S14)

Theme 3, Code 1: "Protecting endangered animals". (S9)

Theme 4, Code 1: "No one will be responsible for what they do alone and shut up in the face of bad behavior". (S2)

Theme 5, Code 1: "If someone gives damage, the person who does this is obliged to contribute to nature and has to participate in activities by these organizations for a while". (S13)

Theme 6, Code 1: "I don't know much about this right now". (S1)

Table 11 shows the results on what should be in the fifth article of the ecological citizenship constitution according to the participants' views.

Table 11: *Findings on the Fifth Article of The Ecological Citizenship Constitution*

The fifth article of the ecological constitution	**f**
Theme 1: Protection in ecological constitution	
Code 1: Prevention of destruction of nature	4
Code 2: Waste management	1
Code 3: Efficient use of natural resources	1
Theme 2: Education in the ecological constitution	
Code 1: Information awareness	1
Theme 3: Right in ecological constitution	
Code 1: Animal rights	3
Theme 4: Responsibility in the ecological constitution	
Code 1: Responsibility to nature	5
Theme 5: Punishment in ecological constitution	
Code 1: Legal punishment against harm to nature	1
Theme 6: Those who have no view of the ecological constitution article	
Code 1: Those who have no view of the ecological constitution article	5

According to the findings in Table 11, the fifth article category of the ecological constitution was created within the scope of the answers given by 21 participants about the fifth item they would want to include in the constitution if they wanted to make an ecological constitution. This category is collected under 6 different themes and 8 codes linked to these themes. The highest number of answers was given in the theme of protection in the ecological constitution and responsibility in the ecological constitution and the lowest number of answers was given in the punishment theme of ecological constitution. The theme of those who had no view of the ecological constitutional article was also included. Examples of the answers given are shown below.

Theme 1, Code 1: "The environment of natural beauty must be surrounded by a safe area and protected". (S4)

Theme 1, Code 2: "Recycling policy for nature can be set". (S15)

Theme 1, Code 3: "A system that we do not belong to us but to nature should be preferred". (S6)

Theme 2, Code 1: "He will know that everything, living or non-living, helps us". (S12)

Theme 3, Code 1: "Law to protect endangered animals". (S14)

Theme 4, Code 1: "Increasing planting with organized campaigns and encouraging the public to do so". (S5)

Theme 5, Code 1: "People who pollute the environment should be identified and clean their own neighborhoods that year". (S17)

Theme 6, Code 1: "I don't know much about this right now". (S1)

Çalışmanın yöntem bölümünde araştırma ve yayın etiğine uyulduğuna dair ifadeye yer verilmelidir.

4. DISCUSSION

The 21 students who participated in the study were asked about their views on ecological citizenship. When the answers were evaluated, the answers most given under the concept of ecological citizenship were on awareness of the rights and responsibilities. Ecological citizenship is defined by Karatekin and Uysal (2018) as: "The citizen who knows their rights and responsibilities to everyone in the ecosystem and who can control their footprints for a sustainable life that demonstrates the characteristics of participating behavior toward the environmental problems". Given this definition, it is understood that teacher candidates know ecological citizenship. This result can also be explained by up-to-date information of science teacher candidates. It is also thought that science teacher candidates have taken environmental courses in their education lives and therefore they are adequate in terms of ecological citizenship (Koca, 2021). Today, increasing environmental problems, such as global climate change, can lead people to gain greater responsibility for their environmental rights. It is thought that the ecological citizenship of science teachers may have an impact on environmental courses and practices to ensure their permanence (Koca, 2021). General biology and environmental courses given in undergraduate education according to Karakaya and Yılmaz (2017) are effective in the development of ethical behavior toward the environment in individuals. The increase in the level of information for environmental education in higher education institutions has a positive effect on information and attitude in teacher candidates (Teksoz, 2010). The results of the study support the literature.

It has been concluded that teacher candidates are eligible to participate in eco-citizenship in the context of their activities against environmental and environmental problems. In this context, many of the teacher candidates have stated that they participate through the Internet and social media or NGOs. It is thought that the conservation of the right to the environment in science teacher candidates is primarily due to the awareness that it is important for people and then for all the other creatures that we share this world with (Koca, 2021). At the same time, social media is thought to be both an effective communication tool and an important educational tool to achieve this result. It is effective for teachers to be in environmental practices since childhood (Karakaya, 2018). The studies in the field also support the findings of the research. Similar to the findings of this study, the research by Karatekin Kuş and Merey (2014), Karatekin, Salman and Uysal (2019), Seyihoglu, Sever and Özmen (2018) observed that participants participated in the works of voluntary environmental organizations. Serim (2016) stated that the high value of social rules for the attitude associated with the environment also positively affects the behavior of people in the environment of active organizations. In addition, some studies have concluded that membership in voluntary environmental institutions contributes to the development of ecological

information, attitudes, and behaviors (Çimen & Yimur, 2013), while some studies have expressed that there is no relationship between them (Karademir et al., 2016; Özdemir Özden, 2011; Özgün & Özgün, 2019; Uludağ & Cingi, 2017). Barry (2005) said that individuals may act as ecological citizens, even if they are not a members of voluntary environmental organizations.

In relation to environmental responsibilities and environmental problems, teacher candidates have expressed their attention to their responsibility to animals. It has been concluded that the participants are responsible for their ability to become ecological citizens. Science teacher candidates are thought to know their responsibilities to individuals so that all living and non-living beings in the universe can survive and leave a habitable world for future generations. In order to sustain the existence of all living and non-living beings in this universe and to leave a habitable world for future generations, it is thought that the responsibility of this right is realized by science teachers (Koca, 2021). This can also be the responsibility of ecological citizenship of environmental education given during university education. According to Yılmaz (2019), the active participation of students in activities ensures that environmental issues are learned and stay permanent.

In relation to what needs to be taken care of for a sustainable future in ecological citizenship, teacher candidates have given an opinion on recycling for a sustainable future and the need for protection of life in nature. The analysis of teacher candidates' conversations suggested that an ecological citizen has a sustainability capability. It is thought that a social effort is needed to resolve environmental issues and to leave a sustainable nature in the emergence of this outcome. Important tasks and responsibilities are given to teachers who will provide children with this awareness and environmental education, especially given that children must be aware of environmental issues and involved in the process. With global change, urbanization is thought to be increasing, migrating to cities, and the concentration of the population living in cities, which triggers environmental pollution, and industrial production as well as increased pollution is the cause of widespread pollution. The desire to maintain the levels of prosperity that industrial societies have achieved and the thought that pressure on nature is increased recall that individuals have a knowledgeable view. Environmental sustainability is thought to be the impact of the education on the environment in the school and the channel of books - newspapers - conferences - and seminars. Similar to the present research, Barbas et al. 2007) stated that it is necessary to establish sustainable environmental awareness by starting to provide environmental awareness during the education process. In this framework, it is beneficial to increase sensitivity through natural film displays by utilizing visual materials in education. Carrier (2009) stated that environmental awareness of the sustainable environment can be gained by education on waste management and recycling in school life.

Teacher candidates, who are concerned about what needs to be considered for the right and justice of the environment and environmental issues, said they are concerned about the environment and environmental issues the most, following the rules, and having a sense of justice for the environment and environmental problems. It was understood that teacher candidates have rights and justice in ecological citizenship and are aware of it. In a study by Karatekin et al. in accordance with this finding (2019), it was concluded that the perception of right and justice was high when the views of science teacher candidates on ecological citizenship were examined.

It has been seen that teacher candidates have been focused most on the rights and protection of rights for nature and what needs to be done about it. It is possible to say that teacher candidates are responsible for leaving a clean and livable environment for the generations to come after themselves and to develop a positive attitude toward the environment. Like the current research, Yavetz et al. (2009) asked participants about their views on nature's rights. The majority of the participants expressed that

nature has the right to life, just as human beings do. On the other hand, the second issue the participants stated as nature's right was the right to protection. The training that individuals receive about the environment enables them to be susceptible to environmental problems and to be able to produce solutions (Knapp, 2006).

In the case of an ecological constitution, the first five articles of the Constitution should be added to the first five articles, and the first five articles of this constitution should generally consist of environmental protection articles. The first article of the ecological constitution designed by teacher candidates is about protection, the second article is about education, the third article is about punishment, the fourth article is about rights and the last article is about responsibility.

5. CONCLUSION

The findings of the study showed that the science teacher candidates thought to have important duties and responsibilities to protect the environment and to create environmental awareness are aware of their environmental issues and are actively involved in solving environmental problems. It is seen that the teacher candidates are aware that people have a certain responsibility to all living things in nature and have an awareness of the protection of the environment for a sustainable environment. These findings are promising for the reduction and resolution of environmental problems.

The conservation of the right of nature and placing it on a legal ground is important to people first, and then to all the other creatures we share this world with. In line with the basic principles of the state, not just the environmental law, the cooperation of NGOs, local governments, and the public will help to leave a more livable world for both present and future generations. In this context, all other educators and all people have duties and responsibilities along with science teachers.

As a result, it is thought that to reduce the changing environmental conditions and consequently resulting immortality, it is necessary to become an ecological citizen and raise ecological citizens (Koca, 2021). It is a great responsibility for science teachers to raise individuals. Therefore, science teacher candidates who have attended undergraduate education before starting the active teaching profession must determine the factors that affect ecological citizenship characteristics and provide education that can make ecological citizenship a philosophy of life.

5.1. Recommendations

The following recommendations may be presented in line with the results obtained in this study:

• As future science teacher candidates are expected to be high-level ecological citizens, environmental education programs applied from pre-school to university must be readdressed in terms of ecological citizenship.

• Nature training and field studies should be more involved in education faculties, which will help to develop positive attitude toward nature and gaining sensitivity.

• The Ministry of Education must cover in-service ecological citizenship and provide training in camps, nature trips, and field training in its in-service teacher training.

• Future research can be done on a comprehensive ecological citizenship scale and researchers can conduct a quantitative study. Ecological citizenship camping programs can be organized and

observations, interviews, and surveys can be applied to participants. A comparative study can be conducted by determining the ecological citizenship of different teaching branches in various ways throughout Turkey.

Authors' Contributions

Researchers contributed equally to the study.

Conflict of Interest

The authors declare no conflicts of interest.

REFERENCES

Alım, M. (2006). Avrupa Birliği üyelik sürecinde Türkiye'de çevre ve ilköğretimde çevre eğitimi. *Kastamonu Eğitim Dergisi, 14*(2), 599-616.

Aydemir, M. (2007). *Öğretmenlerin çevre konuları hakkında bilgilerinin incelenmesi* (Unpublished master's thesis). ODTÜ, Ankara.

Aydın, F., & Kaya, H. (2011). Sosyal bilimler lisesi öğrencilerinin çevre duyarlılıklarınındeğerlendirilmesi. *Marmara Coğrafya Dergisi, 24*, 229-257.

Barbas, A. T., Paraskevopaulos, S., & Stamou, G. A. (2007). The effect of nature documentaries on students environmental sensitivity: A case study. *Learning Media andTechnology, 34*(1), 61-69.

Barry, J. (2005). *Environmental citizenship*. In A. Dobson ve D. Bell (Eds.), *Resistance is fertile: From environmental to sustainability citizenship* (pp. 21-49). London: The MIT Press.

Barry, John (2006). "Resistance is Fertile: *From Environmental to Sustainability Citizenship*

Beck, U. (2003). Toward a critical theory with a cosmopolitan intent. *Constellations, 10*(4), 453-468.

Bozkurt, O., & Koray, Ö. (2002). İlköğretim öğrencilerinin çevre eğitiminde sera etkisi ile ilgili kavram yanılgıları. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 23*(23), 67- 73.

Cansaran, A., & Yıldırım, C. (2017). Çevre bilimi ile ilgili başlıca terimler ve kavramlar. In O. Bozkurt (Ed.), *Çevre eğitimi* (pp. 1-9). Pegem Akademi.

Carrier, J. S. (2009). Environmental education in the schoolyard: Learning styles andgender. *The Journal of Environmental Education, 40*(3), 3-12.

Çimen, O., & Timur, S. (2013). Öğretmen adaylarının çevreye yönelik olumsuz davranışlarının incelenmesi. *Turkish Studies, 8*, 335-346.

Deniş, H., & Genç, H. (2007). Çevre bilimi dersi alan ve almayan sınıf öğretmenliği öğrencilerinin çevreye ilişkin tutumları ve çevre bilimi dersindeki başarılarının karşılaştırılması. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 13*, 20-26.

Dobson, A. (2003). *Citizenship and the environment*. New York: Oxford Üniversity Press.

Duvall, J., & Zint, M. (2007). A review of research on the effectiveness of environmental education in promoting ıntergenerational learning. *Journal of Environmental Education, 38*(4), 14-24.

Erdal, H., Erdal G., & Yücel M. (2013). Üniversite öğrencilerinin çevre bilinç düzeyi araştırması: Gaziosmanpaşa Üniversitesi örneği. *Gaziosmanpaşa Bilimsel Araştırma Dergisi, 4*, 57-65.

Erten, S. (2004). Çevre eğitimi ve çevre bilinci nedir, çevre eğitimi nasıl olmalıdır?. *Çevre ve İnsan Dergisi, 65*(66), 1-13.

Erten, S. (2005). Okul öncesi öğretmen adaylarında çevre dostu davranışların araştırılması. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 28*(28), 91-100.

Erten, S. (2012). Türk ve Azeri öğretmen adaylarında çevre bilinci. *Eğitim ve Bilim, 37*(166), 88-100.

Genç, H., & Karabal, M. (2016). Çevre eğitimi ve çevre bilinci. In H. Genç (Ed.), *Çevre eğitimi* (pp. 111-128). İstanbul: Lisans.

Gündüz, F. (2004). Çevre ve turizmin sürdürülebilirliği. *Şişli Belediyesi Planlama,* (1), 58-66.

Hawthorne, M., & Alabaster, T. (1999). *Citizen 2000: Development of a model of environmental citizenship*. Global Environmental Change.

Horton, D. (2005). Environmental citizenship. In A. Dobson & D. Bell (Eds.), *A study of everyday life among green activists* (pp.127-151). London: The MIT Press.

Jagers, S.C., Martınsson, J., & Mattı, S. (2009). *On how to make the theoretical concept of ecological citizenship empirically operational*. Paper presented at The Climate Change. Politics and Political Theory Workshop, Uppsala University.

Johnson, E., & Mappin, M. (2005). *Environmental education and advocacy*. UK: CambridgeUniversity Press.

Karademir, A. H., Uludağ, G., & Cingi, M.A. (2017). Okul öncesi öğretmen adaylarının sürdürülebilir çevreye ilişkin davranış düzeylerinin incelenmesi. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 41*, 120-136.

Karaismailoğlu, S. E. (2018). *Öğretmenlerin çevre bilinci düzeyinin belirlenmesi: Ankara Etimesgut örneği*. (Unpublished master's thesis). Hacettepe Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara.

Karakaya, F., & Yılmaz, M. (2017). Environmental ethics awareness of teachers. *International Electronic Journal of Environmental Education, 7*(2), 105-115.

Karakaya, F., Avgın, S. S., & Yılmaz, M. (2018). Fen bilgisi öğretmen adaylarının çevreye yönelik etik tutumlarının incelenmesi. *Başkent University Journal of Education, 5*(2), 225-232.

Karatekin, K., & Uysal, C. (2018). Ecological citizenship scale development study. *International Elektronic Journal of Environment Education, 8*(2), 82-104.

Karatekin, K., Kuş, Z., & Merey, Z. (2014). Sosyal bilgiler öğretmen adaylarının çevre sorunlarının çözümünde sosyal katılımları. *İlköğretim Online, 13*(2), 345-361.

Karatekin, K., Salman, M. & Uysal, C. (2019). Öğretmen adaylarının ekolojik vatandaşlık düzeylerinin karşılaştırılması. *Kastamonu Eğitim Dergisi, 27*(4), 1747-1756.

Kaypak, Ş. (2013). Çevre sorunlarının çözümünde küresel çevre politikalarının önemi. *Muğla Sıtkı Koçman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 31*, 17-34.

Keleş, İ., Metin, H., & Sancak, Ö.H. (2005). *Çevre kalkınma ve etik*. Ankara: Alter.

Keleş, Ö., Uzun, N. & Varnacı Uzun, F. (2010). Öğretmen adaylarının çevre bilinci, çevreseltutum, düşünce ve davranışlarının doğa eğitimi projesine bağlı değişimi ve kalıcılığınındeğerlendirilmesi. *Elektronik Sosyal Bilimler Dergisi, 9*(32), 384-401.

Kılıç, S., & Tok, N. (2014). Geleneksel adalet anlayışlarından çevresel adalet anlayışına. *Uluslararası Alanya İşletme Fakültesi Dergisi, 6*(3), 213-228.

Kılıçoğlu, P. (2005). *Türkiye'nin çevre politikalarında sürdürülebilir gelişme*. Ankara: Turhan.

Kışoğlu, M., Yıldırım, T., Salman, M., & Sülün, A. (2016). İlkokul ve ortaokullarda çevre eğitimi verecek olan öğretmen adaylarında çevre sorunlarına yönelik davranışların araştırılması. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi, 18*(1), 299-318.

Knapp, C. E. (2000). *Just beyond the classroom: Community adventures for interdisciplinary learning*. Charleston, WV: ERIC Clearinghouse on Rural Education and Small Schools.

Koca, G. (2021). *Fen bilgisi öğretmen adayları ve ekolojik vatandaşlık: Faaliyetler ve görüşler* (Unpublished master's thesis). Ondokuz Mayıs Üniversitesi Eğitim Bilimler Enstitüsü, Samsun.

Kyburz-Graber, R. (1999). Eleştirel eğitim olarak çevre eğitimi: Öğretmenler ve öğrenciler zorluklarla nasıl başa çıkıyor. *Cambridge Eğitim Dergisi, 29*(3), 415-432.

Latta, P. Alex & Garside, Nick (2005). *Eco-Justice and Environmental Citizenship*

MacGregor, Sherilyn (2006). *Beyond Mothering Earth: Ecological Citizenship and the Politics of Care*

McKeown-Ice, R. (2000). Environmental education in the united states: A survey of preserviceteacher education programs. *The Journal of Environmental Education, 32*(1), 4-11.

Mengi, A., & Algan, N. (2003). *Küreselleşme ve yerelleşme çağında bölgesel sürdürülebilirgelişme. AB ve Türkiye örneği*. Ankara: Siyasal.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook.* New York: Sage Publications, Inc.

Morgil, I., Yılmaz, A., & Cingör, N (2002). *Fen eğitiminde çevre ve çevre koruma projesi hazirlamasina yönelik çalışma.* V. Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi. ODTÜ, Ankara.

Özdemir Özden, D. (2011). *İlköğretim okullarında çevresel vatandaşlık eğitimi* (Unpublished doctoral dissertation). Marmara Üniversitesi Sosyal Bilimler Enstitüsü, İstanbul.

Özgün, B. B., & Özgün, V. (2019). Doğayla ilişkinin önemi: Sınıf ve okul öncesi öğretmen adayları örneği. *Karaelmas Journal of Educational Sciences, 7*, 37-56.

Öztürk, E. (2013). *Uluslararası bir çevre eğitimi projesinin fen ve teknoloji öğretmen adaylarının çevre bilincine etkisi* (Unpublished doctoral dissertation). Hacettepe Üniversitesi, Sosyal Bilimler Enstitüsü, Ankara.

Palmer, J., & Neal, P. (1996). *The handbook of environmental education*. London: Routledge.

Sanera, M. and Shaw, J.S. (1999). *Korkular değil gerçek çocuklarınız ve sizin için çevre eğitimi rehberi* (V. F. Savaş, Çev.). Ankara: Liberte.

Serim, N. (2016). *Çevre ve doğal kaynaklar ekonomisi*. Bursa: Ekin.

Seyfang, Gill (2006). "Ecological Citizenship and Sustainable Consumption: *Examining Local Organic Food Networks*

Şeyihoğlu, A., Sever, R., & Özmen, F. (2018). Sosyal bilgiler ve coğrafya öğretmen adaylarının zihin haritalarında günümüz dünya sorunları. *Marmara Coğrafya Dergisi*, (37), 1-15.

Şimşekli, Y. (2004). Çevre bilincinin geliştirilmesine yönelik çevre eğitimi etkinliklerine ilköğretim okullarının duyarlılığı. *Uludağ Üniversitesi Eğitim Fakültesi Dergisi, 17*(1) 83-92.

Teksöz, G., Şahin, E., & Ertepinar, H. (2010). Çevre okuryazarlığı, öğretmen adayları ve sürdürülebilir bir gelecek. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *39*(39), 307-320.

Tuncer, G., Tekkaya, C., Sungur, S., Çakıroğlu, J., Ertapınar, H., & Kaplowitz, M. (2009). Assessing pre-service teachers' environmental literacy in Turkey as a mean to developteacher education programs. *International Journal of Educational Development, 29*, 426-436.

Uysal, C. (2018). *Sınıf öğretmeni adaylarının ekolojik vatandaşlık düzeylerinin belirlenmesi* (Unpublished master's thesis). Kastamonu Üniversitesi Sosyal Bilimler Enstitüsü, Kastamonu.

Yavetz, B., Goldman, D., & Pe'er, S. (2009). Environmental literacy of pre-service teachersin Israel: A comparison between students at the onset and end of their studies. *Environmental Education Research, 15*(4), 393-415.

Yaylacı, G.F. (2012). *Yeni toplumsal hareketler*. Eskişehir: Anadolu Üniversitesi.

Yıkılmaz, N. (2004). *Yeni dünya düzeni ve çevre*. İstanbul: Sosyal Araştırmalar Vakfı.

Yıldırım, A., & Şimşek, H. (2011). *Sosyal bilimlerde nitel araştırma yöntemleri*. Ankara:Seçkin.

Yılmaz, A., Morgil, F.İ., Aktuğ, P., & Göbekli, İ. (2002). Ortaöğretim ve üniversite öğrencilerinin çevre, çevre kavramları ve sorunları konusundaki bilgileri ve öneriler. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 22*, 156-162.

Yılmaz, M., Çimen, O., Karakaya, F. ve Adıgüzel, M. (2019). Helping students comprehend the needs ofliving things in their natural habitats through creative drama technique: A musical chair game. *International Electronic Journal of Environmental Education, 9*(2), 62-72.