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Investigation of Pre-service Teachers' Environmental Ethics Awareness and Attitudes towards Sustainable Environment[1]

Öğretmen Adaylarının Çevre Etiği Farkındalıkları ve Sürdürülebilir Çevreye Yönelik Tutumlarının İncelenmesi [1]

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ABSTRACT: The aim of this study was to determine the environmental ethics awareness and sustainable environmental attitudes of pre-service teachers to reveal the teachers' access to the content specified in undergraduate education. In the study, the correlational research design was used to determine the extent to which pre-service teachers' environmental ethics awareness predicts their sustainable environmental attitudes. The sample of the study was comprised of 312 pre-service teachers attending a Faculty of Education in the Marmara Region in the spring term of the 2021-2022 academic year. In the study, a personal information form, the "Environmental Ethics Awareness Scale" consisting of 23 items, and the "Sustainable Environmental Attitude Scale" consisting of 27 items were used as data collection tools. In the analysis of the collected data, difference, correlation, and regression analyses were used together with descriptive analyses in line with the purpose and sub-purposes of the study. As a result of the study, it was revealed that the pre-service teachers' environmental ethics awareness was very high, and sustainable environmental attitudes were high. The environmental ethics awareness of the pre-service teachers was found to vary significantly depending on gender in favor of the female pre-service teachers, while their sustainable environmental attitudes were found to not vary significantly depending on gender. In addition, the pre-service teachers' environmental ethics awareness and sustainable environmental attitudes did not differ significantly depending on the department attended, grade level, taking/having taken environment and ethics courses, and relationship with environmental organizations. It was determined that there is a weak, positive, and significant correlation between the pre-service teachers' environmental ethics awareness and sustainable environmental attitudes and that their environmental ethics awareness predicts their sustainable environmental attitudes at a weak level.

Keywords: Environmental ethics awareness, sustainable environment, pre-service teacher, attitude.

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ÖZ: Öğretmenlerin lisans eğitiminde belirtilen içeriğe ulaşma durumlarını ortaya koymak amacıyla öğretmen adaylarının çevre etiği farkındalıkları ve sürdürülebilir çevre tutumlarının belirlenmesi amaçlanmıştır. Araştırmada öğretmen adaylarının çevre etiğine yönelik farkındalıklarının sürdürülebilir çevreye yönelik tutumu yordama gücünü belirlemek için ilişkisel araştırma deseni kullanılmıştır. Araştırmanın örneklemini 2021-2022 eğitim-öğretim yılı bahar döneminde Marmara Bölgesinde yer alan bir eğitim fakültesinde eğitim gören 312 öğretmen adayı oluşturmaktadır. Araştırmada, kişisel bilgi formu, 23 maddeden oluşan "Çevre Etiği Farkındalık Ölçeği" ve 27 maddenin yer aldığı "Sürdürülebilir Çevre Tutum Ölçeği" veri toplama aracı olarak kullanılmıştır. Verilerin analizinde araştırmanın amacı ve alt amaçları doğrultusunda betimsel analizlerle birlikte fark, korelasyon ve regresyon analizleri kullanılmıştır. Araştırma sonucunda çevre etiği farkındalıklarının çok yüksek, sürdürülebilir çevre tutumlarının yüksek düzeyde olduğu ortaya çıkmıştır. Öğretmen adaylarının çevre etiği farkındalıkları cinsiyete göre kadın öğretmen adayları lehine anlamlı düzeyde farklılaştığı, sürdürülebilir çevre tutumlarının ise farklılaşmadığı belirlenmiştir. Ayrıca, öğretmen adaylarının çevre etiği farkındalıkları ve sürdürülebilir çevre tutumlarının eğitim alınan öğretmenlik alanı, sınıf düzeyi, çevre ve etik dersi alma durumları, çevre kuruluşları ile ilişki durumuna göre anlamlı düzeyde farklılaşmadığı ortaya çıkmıştır. Öğretmen adaylarının çevre etiği farkındalıkları ve sürdürülebilir çevre tutumları arasında düşük düzeyde pozitif yönlü anlamlı bir ilişkinin olduğu, çevre etiği farkındalığının sürdürülebilir çevreye yönelik tutumu düşük derecede yordadığı belirlenmiştir.

Anahtar sözcükler: Çevre etiği farkındalığı, sürdürülebilir çevre, öğretmen adayı, tutum.

1. INTRODUCTION

It is known that the environment, which is defined as the setting where living things live, consists of living (biotic) and natural assets such as air, water, soil, mountains, plains, and various buildings and works produced by humans, as well as inanimate (abiotic) elements (Sülün & Sülün, 2006). For this reason, the environment is a structure with living and non-living elements (Kortenkamp & Moore, 2001; Thompson & Barton, 1994) and the survival of every living thing in a healthy way depends on the harmony of living and non-living elements interacting with each other with their environment.

With the developing technology, the increase in industrial activities, the rapidly increasing human population, the unconscious consumption of renewable natural resources, which they thought to be unlimited, to meet the needs of people and increase their economic welfare, especially after the industrial revolution, caused environmental problems (Alım, 2006; Aydoğan, 2010). Climate change and global warming, loss of biodiversity, erosion and desertification, acid rain, ozone depletion, and pollution are among the main environmental problems. As a result of the increasing consumption behaviors harming the natural environment, it was mentioned that sustainability, which is one of the concepts that was included for the first time in the Brundtland Report (Environment and Development Report) in 1987, is a global problem that needs to be thought about for many years on how to educate students in order to meet the needs of the current generation without ignoring the needs of the next generation [World Commission on Environment and Development (WCED, 1987)].

Environmental education has been seen as an important way of sustainable development. From this point of view, sustainable development is defined as meeting the needs of today's and future generations, and it is built on three bases: economic development, social development and environmental protection. For this reason, it has been stated that raising individuals who believe in the concept of sustainable development and adopt it as a philosophy of life is important in preventing environmental problems (Yapıcı, 2003). According to the "Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability" prepared by UNESCO (2005), "Education for Sustainable Development" focuses not on the passive transfer of knowledge, but on the change that knowledge will cause in the skills, attitudes, and behaviors of the individual. In this direction, Kaypak (2011) stated that sustainable development can exist with a sustainable environment, and the concept of a sustainable environment is to ensure the continuity of natural resources. Tanrıverdi (2009) also stated the importance of sustainable development and stated that the concept of sustainable development has gradually gained momentum towards sustainable environmental education and that teachers have a great responsibility in raising individuals with this understanding and skills.

A human being, who is a part of nature, should be responsible for and respect other living and non-living beings on earth. From this point of view, the concept of environmental ethics emerged in the process of developing responsibility and respect for the environment in people. Environmental ethics is expressed as a systematic examination of the relations between humans and nature in line with moral elements (Des Jardins, 2006) and it is seen that it is an important factor affecting attitudes and behaviors in determining environmental decisions and practices. The attitudes and behaviors of people have an important place in the emergence of environmental problems, and environmental ethics is an important element in eliminating these problems. Since the source of environmental problems caused by people's interaction with nature is human attitudes and behaviors, the most basic way to combat these global problems is through the education of all people in society, together with understanding the problems in their environment and accepting the possible dangers (Bozkurt & Cansüngü Koray, 2002; Ramsey, 1981). First of all, teachers who will teach by motivating students, reinforcing learning by associating

the topics with daily life and explaining them in a way that attracts their attention, should know what is needed about this subject and understand the importance of transforming them into behavior (Moseley et al., 2002).

As previously stated, environmental ethics can be defined as a theoretical discipline that examines the principles that affect the attitudes and behaviors that are effective in all kinds of environmental decisions or activities related to the environment, the things that must be done and the determination of the practices to be made regarding the environment (Mahmutoğlu, 2009). In the education to be given for sustainability, besides the knowledge-based subjects, environmental ethics and courage should be given to the students, which motivates them to be responsible for their own behavior (Alım, 2006 as cited in Huckle, 1993). Although it is thought that individuals' attitudes and values towards the environment will change as they become aware of environmental issues (Yücel Işıldar, 2012), research indicates that despite having positive attitudes towards the environment, people's consumption habits do not change (Olli et al., 2001). Due to this contradiction, it has been emphasized that ethical values are needed for the environment, and it is of great importance to internalize these values and be aware of responsibilities, and environmental ethics are closely related to the decisions we make in daily life (Karaarslan Semiz, 2020). When environmental ethics, which is an evaluation of the moral relationship between human beings and their natural environment is examined, it has been observed that the existence of different approaches has emerged (Ertan, 2004). Environmental ethics approaches in the literature are generally divided into three main headings: the human-centered approach (anthropocentric), the life-centered approach (biocentric), and the ecosystem-centered approach (ecocentric) (Kayaer, 2013). In light of the related studies in the literature, according to the human-centered approach, only human beings have a moral value and is the oldest environmental ethical approach that asserts that all other living and non-living beings are valuable because of the benefits they provide to people (Kılıç, 2008; Mahmutoğlu, 2009). According to the life-centered approach, in which the life and survival of all kinds of living things are important, unlike the human-centered approach, it directs its ethical interest to non-human living things, animals, and plants and by going further to the whole community of living things (Ertan, 2004). The ecosystem-centered approach argues that all life forms have equal rights in the functioning of the ecosystem consisting of living and non-living organisms (Akkoyunlu Ertan, 1998).

In 2002, the United Nations declared the period between 2005 and 2014 as the "Decade of Education for Sustainable Development" and determined its basic vision as creating a world where everyone has the opportunity to develop the values, attitudes, understanding and skills required by a sustainable future, and positive social transformation (Alkış, 2009). In Education for Sustainable Development, an interdisciplinary approach has been emphasized that aims to provide children with the necessary knowledge, skills, values, and attitudes to act consciously about environmental protection and sustainability in the pre-school period, as well as in the primary and secondary school levels (Muşlu Kaygısız, 2020). Environmental education, which is in the formal education process, is included as an elective course in secondary school, is included in the courses such as Life Studies, Science, Social Studies and Turkish in primary school, and is included in the pre-school curriculum in the pre-school. From this point of view, the first task which is teaching and acquiring ethical concepts towards the environment and developing a positive attitude towards the environment is the teachers' mission. Similarly, Thomas and Nicita (2002) also stated that teachers have a great responsibility for students to take responsibility for the environment.

The content of undergraduate education has an important place in the development of ethical and sustainable attitudes towards the environment, enriching the environmental activities of teachers, and

increasing the professional equipment related to environmental ethics and sustainable attitudes. Yavetz et al. (2014) found in their study, which aimed to examine the environmental perceptions of pre-service primary school teachers and their relevance to their teaching areas, that pre-service teachers knew the importance of sustainable development but concluded that they did not understand the concept of the environment sufficiently. Additionally, Altın and Akcanca (2023) stated in their research, where they determined the environmental education self-efficacy, environmental ethics awareness perceptions, and ecological citizenship levels of pre-service preschool teachers and predicted their influence on each other, that environmental ethics awareness supportive courses could be added to the content of undergraduate programs to enhance environmental ethics awareness perceptions. Kumar and Rani (2018) mentioned that environmental education plays an important role in achieving its objectives and creating awareness towards the environment, indicating the significance of integrating environmental education content into teacher education to ensure this outcome. It can be said that the attitudes of pre-service teachers towards the environment and their awareness of environmental ethics hold significant importance in the preparation and delivery of the mentioned content.

For this reason, environmental ethics education gains importance to create positive awareness and attitude towards the environment and to reveal positive behaviors towards the environment. Since teachers have a key role in the development of attitudes towards the environment on individuals, it is important for pre-service teachers to have positive attitudes towards the sustainable environment and to make them care for a sustainable environment. From this point of view, it is aimed to determine the environmental ethics awareness and sustainable environmental attitudes of pre-service teachers to reveal the teachers' access to the content specified in their undergraduate education.

1.1. The Research Problem

The aim of the research is to determine the environmental ethics awareness and sustainable environmental attitudes of pre-service teachers. In line with the aim of the study, the research problem was determined as “What is the environmental ethics awareness and sustainable environmental attitudes of the pre-service teachers?” The sub-problems of the research are stated below:

1. What is the level of pre-service teachers’ environmental ethics awareness?
2. Does environmental ethics awareness of pre-service teachers differ significantly according to the variables of gender, department, grade level, taking environment and ethics courses at university or not, and relationship with environmental organizations?
3. What is the level of pre-service teachers’ attitudes towards a sustainable environment?
4. Do pre-service teachers’ attitudes towards a sustainable environment differ significantly according to the variables of gender, department, grade level, taking environment and ethics courses at university or not, and relationship with environmental organizations?
5. Does it predict pre-service teachers’ awareness of environmental ethics and their attitudes towards a sustainable environment?

2. METHOD

2.1. Research Design

This research, which was conducted to determine whether pre-service teachers’ environmental ethics awareness predicts their attitudes towards a sustainable environment, was designed as a descriptive

correlational survey model. The correlational survey model aims to determine the difference between two or more variables and to find out the degree of it (Karasar, 2016).

2.2. Setting and Participants

The population of the study consists of pre-service teachers enrolled in the Faculty of Education of a university located in the Marmara Region during the spring semester of the 2021-2022 academic year. In determining the sample, criterion sampling, which is a purposive sampling method, was used. The criterion for selecting the sample was whether pre-service teachers were currently taking or would take courses related to environmental education during their teacher training process. The determined criterion is provided by the programs of Preschool, Primary Education, and Elementary School Mathematics and Science Teacher Education, which are included in the population of the study. A total of 312 pre-service teachers from this sample group participated in the study. Table 1 shows the distribution of pre-service teachers regarding the variables of gender, department, grade level, whether taking environment and ethics courses at university or not and relationship with environmental organizations.

Table 1: *The Demographic Information of Pre-Service Teachers in The Study Group*

Variables		n	%
Gender	Female	265	84.9
	Male	47	15.1
Department	Pre-school education	77	24.7
	Primary school education	91	29.2
	Elementary Mathematics education	48	15.4
	Science education	96	30.8
Grade level	1st grade	68	21.8
	2nd grade	71	22.8
	3rd grade	130	41.7
	4th grade	43	13.8
Whether taking environment courses or not	Yes, I've.	175	56.1
	No, I've not.	137	43.9
Whether taking ethics courses or not	Yes, I've.	188	60.3
	No, I've not.	124	39.7
Relationship with environmental organizations	I don't know anything about organizations.	62	19.9
	I know the names of organizations.	203	65.1
	I'm a member of an organization/organizations	47	15.1

Table 1 shows that the rate of females in the study group of the research is 84.9%. When the participants in the study were examined according to the department, it was determined that the number of those who were in primary, pre-school and science education was close to each other, and the number of those who received training in elementary mathematics education was less. Considering the grade

levels, 21.8% were first grade, 22.8% were second grade, 41.7% were third grade and 13.8% were fourth grade. 56.1% of the pre-service teachers stated that they took environment courses and 60.3% ethics courses.

In addition, 19.9% of the pre-service teachers in the study stated that they did not know anything about environmental organizations, 65.1% said they knew the names of environmental organizations, and 15.1% were members of environmental organizations.

2.3. Data Collection Tools

In line with the purpose of the research, the "Personal Information Form" prepared by the researchers, the "Environmental Ethics Awareness Scale" developed by Özer and Keleş (2016) and the "Sustainable Environmental Attitude Scale" developed by Yıldız (2011) were used to collect data. The personal information form prepared by the researchers consists of six questions containing information about the pre-service teachers' gender, department, grade level, whether taking environment and ethics courses at university or not, and their relationship with environmental organizations.

2.3.1. Environmental Ethics Awareness Scale

The Environmental Ethics Awareness Scale was developed by Özer and Keleş (2016) to determine the awareness of pre-service teachers about environmental ethics. The scale consists of four factors and 23 items: the definition of environmental ethics (7 items), measures to be taken for environmental ethics (8 items), the reasons for the emergence of environmental ethics (5 items), and the purpose of environmental ethics (3 items). A five-point Likert scale (1: Strongly disagree, 2: Agree, 3: Undecided, 4: Agree, 5: Strongly agree) was used to evaluate the statements in the scale. A total of 115 points and the lowest 23 points can be obtained from the scale, and as the score increases, it is seen that awareness of environmental ethics increases. When the values of RMSEA=0.070, CFI=0.96, AGFI=0.86, and NFI=0.95 are examined regarding the validity of the scale, it is observed that the measurement instrument is valid. The Cronbach Alpha, which is expressed as the internal consistency coefficient of the items in the scale, was found to be 0.95 in the scale. In our study, the Cronbach Alpha value was found to be 0.86. This value indicates that the measurement tool is reliable in the research.

2.3.2. Sustainable Environmental Attitude Scale

The Sustainable Environmental Attitude Scale was developed by Yıldız (2011) in order to reveal the attitudes of pre-service teachers towards the sustainable environment. The scale consists of a total of 27 items, namely, the factors of the importance of the environment (15 items), use of environmental resources (7 items), and consumption habits (5 items). A five-point Likert (1: Strongly disagree, 2: Agree, 3: No idea, 4: Agree, 5: Strongly agree) was used to indicate the pre-service teachers' agreement with the item statements in the scale. Pre-service teachers can get the lowest 27 and the highest 135 points from the scale, and an increase in the score indicates that their attitude towards a sustainable environment increases. In the original version of the scale, the KMO value was calculated as .882, and the result of Bartlett's test was 7014.473 (p=.000). The factor loadings of the items in the scale range from .469 to.777. The lowest correlation value for the items was calculated as .287, while the highest correlation value was.685. In the scale development process, the Cronbach Alpha value of the internal consistency

coefficient was found to be 0.89. In the research process, the Cronbach Alpha value was determined as 0.88. This value indicates that the measurement tool made a reliable measurement in the research.

2.4. Data Collection Process

Necessary permissions were obtained from the data collection tools to carry out the research. After the permissions obtained from the data collection tools, the ethics committee permission was obtained from Kocaeli University Social and Human Sciences Ethics Committee on 16.11.2021. The pre-service teachers, who studied at the departments of pre-school, primary teacher, science and elementary mathematics education at the Faculty of Education were informed about the purpose of the research. The data were collected by taking the necessary permissions in March 2022 and including 328 voluntary pre-service teachers who took part in the course process. After the data were collected, improper and incomplete data were removed, and the data of 312 pre-service teachers were included in the analysis process.

2.5. Data Analysis Process

Two different scales were used in accordance with the purpose of the study. During the data analysis, first, the reliability values of the scales were calculated. After calculating the reliability values, the mean and standard deviation values of the scales were checked. The skewness and kurtosis values were examined to determine the normality of the data set. For the environmental ethics awareness scale, the skewness value was 0.856, and the kurtosis value was 1.216. For the sustainable environmental attitude scale, the skewness value was 1.114, and the kurtosis value was 1.318. These values fall within the range of-1.50 to +1.50, indicating the normal distribution of the data according to Tabachnick and Fidell (2007). It was determined that the scores obtained from the scales showed a normal distribution. Descriptive analyses were used to determine the environmental ethics awareness and environmental attitudes of pre-service teachers. If the mean score of environmental ethics awareness and attitude towards the environment of the pre-service teachers participating in the research is 1.00-2.33, it is “low”, 2.34-3.66 indicates “medium” and 4.67-5.00 indicates a “high” level. The average scores of environmental ethics awareness and sustainable environmental attitude among pre-service teachers participating in the study indicate different levels: scores ranging from 1.00 to 1.80 are categorized as "very low," scores between 1.81 and 2.60 are considered "low," scores from 2.61 to 3.40 are classified as "medium," scores ranging from 3.41 to 4.20 are labeled "high," and scores between 4.21 and 5.00 are denoted as "very high.".

The t-test was used to calculate the mean scores of pre-service teachers’ environmental ethics awareness and attitude towards the environment regarding the variables of gender, and whether taking environment and ethics courses or not; A One-Way ANOVA test was conducted to determine whether it differs according to the variables of department, grade level and relationship with environmental organizations. In addition, Pearson Correlation analysis and simple regression analysis were used to determine whether environmental ethical awareness predicted attitudes towards the environment. If the correlation coefficient value is 0.70-1.00, it means “strong”, 0.70-0.30 “moderate” and 0.30-0.00 “weak” level of relationship (Büyüköztürk, 2011). The results of the analysis are given in the findings section.

3. FINDINGS

In this section, the results of the analyses for the sub-problems are presented and interpreted in line with the purpose of the research. The findings regarding the environmental ethics awareness levels of pre-service teachers are given in Table 2.

Table 2: *Descriptive Statistics on Environmental Ethics Awareness Levels of Pre-Service Teachers*

	n	$\overline{X}$	sd	Level
Environmental ethics awareness	312	4.79	.27	Very high
The definition of environmental ethics	312	4.84	.28	Very high
The measures to be taken for environmental ethics	312	4.69	.36	Very high
The reasons for the emergence of environmental ethics	312	4.69	.43	Very high
The purpose of environmental ethics	312	4.93	.23	Very high

According to Table 2, it was determined that the mean of environmental ethics awareness scores of pre-service teachers was ($\overline{X}$) 4.79. In line with this finding, it is seen that the environmental ethics awareness levels of the pre-service teachers are "very high". It was found that the pre-service teachers were at a "very high" level in the sub-dimensions of the definition of environmental ethics ($\overline{X}$ =4.84), the measures to be taken for environmental ethics, and the reasons for the emergence of environmental ethics ($\overline{X}$ =4.69) and the purpose of environmental ethics ($\overline{X}$ =4.93). In addition, it was determined that the "purpose of environmental ethics" sub-dimension had the highest mean among the sub-dimensions. Table 3 shows the findings of the t-test conducted to determine the difference in pre-service teachers' environmental ethics awareness scores according to the gender variable.

Table 3: *T-Test Results of Pre-Service Teachers' Environmental Ethics Awareness Scores According to Gender Variable*

	Groups	n	$\overline{X}$	sd	df	t	p
Environmental ethics awareness	Female	265	4.81	0.22	310	3.40	.00
	Male	47	4.67	0.43			
The definition of environmental ethics	Female	265	4.87	0.21	310	4.27	.00
	Male	47	4.69	0.48			
The measures to be taken for environmental ethics	Female	265	4.70	0.33	310	1.37	.17
	Male	47	4.63	0.48			
The reasons for the emergence of environmental ethics	Female	265	4.72	0.39	310	2.59	.01
	Male	47	4.54	0.56			
The purpose of environmental ethics	Female	265	4.95	0.18	310	3.81	.00
	Male	47	4.81	0.39			

*p<.05

According to Table 3, as a result of the t-test conducted to determine whether the environmental ethics awareness scores of pre-service teachers differ significantly according to their gender, it was revealed that there was a significant difference (t_{310}=3.40; p<.05). It was seen that the significant difference was in favor of female ($\overline{X}$ = 4.81) pre-service teachers.

The definition of environmental ethics (t=4.27; p<.05), which is one of the environmental ethics awareness sub-dimensions, the reasons for the emergence of environmental ethics (t=2.59; p<.05), and the purpose of environmental ethics (t=3.81; p<.05) differed significantly in favor of female pre-service teachers according to gender. However, it was observed that the sub-dimension of measures to be taken for environmental ethics did not differ significantly according to gender (t=1.37; p>.05). The findings of the One-Way ANOVA test, which was conducted to determine the difference between pre-service teachers' environmental ethics awareness scores according to the variable of the department they were studying at, are given in Table 4.

Tablo 4: *One-Way ANOVA Test Results of Pre-Service Teachers' Environmental Ethics Awareness Scores According to The Variable of The Department They Were Studying At*

f, $\overline{X}$ and sd Values				ANOVA Results					
Groups	**n**	$\overline{X}$	**sd**	**Source of Variation**	**Sum of Squares**	**df**	**Mean Squares**	**F**	**p**
Pre-school education	77	4.80	.19	Between groups	.51	3	.17	2.36	.07
Primary school education	91	4.81	.23	Within groups	22.52	308	.07		
Elementary mathematics education	48	4.69	.41	Total	23.04	311			
Science education	96	4.80	.26						

According to Table 4, as a result of the One-Way ANOVA test, which was conducted to determine whether the environmental ethics awareness scores of pre-service teachers differ significantly according to their department, it was revealed that there was no significant difference between the groups [$F_{(3,308)}$ =2.36; p>.05]. In addition, it was observed that the mean of environmental ethics awareness scores of the students of primary teacher education ($\overline{X}$ =4.81) eas the highest, and the mean of environmental ethics awareness scores of the students of elementary Mathematics education ($\overline{X}$ =4.69) was the lowest.

The findings of the One-Way ANOVA test, which was conducted to determine the difference in pre-service teachers' environmental ethics awareness scores according to grade level variable, are given in Table 5.

Table 5: *One-Way ANOVA Test Results of Pre-Service Teachers' Environmental Ethics Awareness Scores According to Grade Level Variable*

f, $\overline{X}$ and sd Values				ANOVA Results				
Groups	**n**	$\overline{X}$	**sd**	**Source of Variation**	**Sum of Squares**	**df**	**Mean Squares**	**F**	**p**
1st grade	68	4.79	.18	Between groups	.03	3	.01	.15	.92
2nd grade	71	4.79	.28	Within groups	23.01	308	.07		
3rd grade	130	4.78	.31	Total	23.04	311			
4th grade	43	4.81	.21						

According to Table 5, as a result of the One-Way ANOVA test conducted to determine whether the environmental ethics awareness scores of pre-service teachers differ significantly according to the grade level variable, it was revealed that there was no significant difference between the groups [$F_{(3,308)}$ =.15; p>.05]. In addition, it was observed that the mean environmental ethics awareness scores of 4th-grade students ($\overline{X}$ =4.81) were the highest, and the 3rd-grade students ($\overline{X}$ =4.78) were the lowest.

The t-test findings, which were conducted to determine the difference in pre-service teachers' environmental ethics awareness scores according to the variable of whether taking an environment course or not, are given in Table 6.

Table 6: *T-Test Results of Pre-Service Teachers' Environmental Ethics Awareness Scores According to The Variable of Whether Taking Environment Course or Not*

	Groups	**n**	$\overline{X}$	**sd**	**df**	**t**	**p**
Environmental ethics awareness	Yes, I've.	175	4.80	.28	310	.72	.47
	No, I've not.	137	4.78	.26			
The definition of environmental ethics	Yes, I've.	175	4.85	.29	310	.34	.73
	No, I've not.	137	4.84	.26			
The measures to be taken for environmental ethics	Yes, I've.	175	4.71	.37	310	.79	.42
	No, I've not.	137	4.67	.35			
The reasons for the emergence of environmental ethics	Yes, I've.	175	4.70	.43	310	.71	.47
	No, I've not.	137	4.67	.42			
The purpose of environmental ethics	Yes, I've.	175	4.93	.20	310	.38	.70
	No, I've not.	137	4.92	.26			

According to Table 6, as a result of the t-test conducted to determine whether the environmental ethics awareness scores of the pre-service teachers differ significantly according to whether taking an environment course or not, it was revealed that there was no significant difference (t_{310}=.72; p>.05). When the environmental ethics awareness sub-dimensions were examined, it was determined that all sub-dimensions did not differ significantly according to whether taking an environment course or not. The t-test findings, which were conducted to determine the difference in pre-service teachers'

environmental ethics awareness scores according to the variable of whether taking an ethics course or not, are given in Table 7.

Table 7: *T-Test Results of Pre-Service Teachers' Environmental Ethics Awareness Scores According to The Variable of Whether Taking an Ethics Course or Not*

	Groups	**n**	$\overline{X}$	**sd**	**df**	**T**	**p**
Environmental ethics awareness	Yes, I've.	188	4.80	.24	310	.66	.50
	No, I've not.	124	4.78	.31			
The definition of environmental ethics	Yes, I've.	188	4.86	.23	310	1.70	.08
	No, I've not.	124	4.81	.33			
The measures to be taken for environmental ethics	Yes, I've.	188	4.69	.34	310	-.04	.96
	No, I've not.	124	4.69	.39			
The reasons for the emergence of environmental ethics	Yes, I've.	188	4.70	.40	310	.61	.54
	No, I've not.	124	4.67	.47			
The purpose of environmental ethics	Yes, I've.	188	4.93	.21	310	-.00	.99
	No, I've not.	124	4.93	.25			

According to Table 7, as a result of the t-test conducted to determine whether the environmental ethics awareness scores of the pre-service teachers differ significantly according to whether taking an ethics course or not, it was revealed that there was no significant difference (t_{310}=.66; p>.05). When the environmental ethics awareness sub-dimensions were examined, it was seen that all sub-dimensions did not differ significantly according to whether taking an ethics course or not. The findings of the One-Way ANOVA test, which was conducted to determine the difference in pre-service teachers' environmental ethics awareness scores according to the variable of relationship with environmental organizations, are given in Table 8.

Table 8: *One-Way ANOVA Test Results of Pre-Service Teachers' Environmental Ethics Awareness Scores According to Relationship with Environmental Organizations Variable*

f, $\overline{X}$ and sd Values				**ANOVA Results**					
Groups	**n**	$\overline{X}$	**sd**	**Source of Variation**	**Sum of Squares**	**df**	**Mean Squares**	**F**	**p**
I don't know anything about organizations.	62	4.80	.31	Between groups	.01	2	.01	.11	.89
I know the names of organizations.	203	4.79	.26	Within groups	23.03	309	.07		
I'm a member of an organization/organizations	47	4.77	.22	Total	23.04	311			

According to Table 8, as a result of the One-Way ANOVA test, which was conducted to determine whether the environmental ethics awareness scores of pre-service teachers differ significantly according

to the variable of relationship with environmental organizations, it was revealed that there was no significant difference between the groups [$F_{(2,309)}$ =.11; p>.05].

The findings regarding the sustainable environmental attitude levels of pre-service teachers are given in Table 9.

Table 9: *Descriptive Statistics on The Sustainable Environmental Attitudes of Pre-Service Teachers*

	n	$\overline{X}$	**sd**	**Level**
Sustainable environmental attitude	312	3.56	.50	High
The importance of the environment	312	3.73	.49	High
Use of environmental resources	312	3.22	.69	Medium
Consumption habits	312	3.55	.53	High

According to Table 9, it was determined that the mean of the sustainable environmental attitude scores of the pre-service teachers is ($\overline{X}$) 3.56. In line with this finding, it was seen that the sustainable environmental attitude levels of the pre-service teachers were "high". The sub-dimensions of the importance of the environment ($\overline{X}$ =3.73) and consumption habits ($\overline{X}$ =3.55) of pre-service teachers were "high" and the sub-dimension of the use of environmental resources ($\overline{X}$ =3.22) was at a "medium" level.

The t-test findings, which were conducted to determine the difference in the pre-service teachers' sustainable environmental attitude scores according to the gender variable, are given in Table 10.

Tablo 10: *T-Test Results of Pre-Service Teachers' Sustainable Environmental Attitude Scores According to Gender Variable*

	Groups	**n**	$\overline{X}$	**sd**	**df**	**T**	**p**
Sustainable environmental attitude	Female	265	3.48	.15	310	-.94	.34
	Male	47	3.56	.60			
The importance of the environment	Female	265	3.72	.48	310	-.32	.74
	Male	47	3.75	.56			
Use of environmental resources	Female	265	3.19	.68	310	-1.12	.26
	Male	47	3.32	.77			
Consumption habits	Female	265	3.53	.51	310	-1.01	.31
	Male	47	3.62	.63			

According to Table 10, as a result of the t-test conducted to determine whether the sustainable environmental attitude scores of pre-service teachers differ significantly according to gender, it was revealed that there was no significant difference (t_{310}=-.94; p>.05). Although there was no significant difference, the mean of the sustainable environmental attitude scores of male pre-service teachers ($\overline{X}$ = 3.56) compared to female pre-service teachers ($\overline{X}$ = 3.48).

It has been observed that the importance of the environment (t_{310}=-.32; p>.05), the use of environmental resources (t_{310}=-1.12; p>.05) and consumption habits (t_{310}=-1.01; p>.05), which are among the sub-dimensions of sustainable environmental attitudes, do not differ significantly according to gender. The findings of the One-Way ANOVA test, which was conducted to determine the difference in the pre-service teachers' sustainable environmental attitude scores according to the variable of the variable of department they were studying at, are given in Table 11.

Table 11: *One-Way ANOVA Test Results of Pre-Service Teachers' Sustainable Environmental Attitude Scores According to The Variable of Department They Were Studying At*

f, $\overline{X}$ and sd Values				ANOVA Results				
Groups	**n**	$\overline{X}$	**sd**	**Source of Variation**	**Sum of Squares**	**Df**	**Mean Squares**	**F**	**p**
Pre-school education	77	3.53	.51	Between groups	.86	3	.28	1.03	.37
Primary school education	91	3.46	.49	Within groups	85.08	308	.27		
Elementary mathematics education	48	3.40	.45	Total	85.94	311			
Science education	96	3.54	.58						

According to Table 11, as a result of the One-Way ANOVA test, which was conducted to determine whether the sustainable environmental attitude scores of pre-service teachers differ significantly according to the department they were studying at, it was revealed that there was no significant difference between the groups [$F_{(3,308)}$ =1.03; p>.05]. In addition, it was seen that the mean of the sustainable environmental attitude scores of students of the science education department ($\overline{X}$ =3.54) was the highest, and the elementary mathematics education ($\overline{X}$ =3.40) was the lowest.

The findings of the One-Way ANOVA test, which was conducted to determine the difference of pre-service teachers' sustainable environmental attitude scores according to grade level variable, are given in Table 12.

Table 12: *One-Way ANOVA Test Results of Pre-Service Teachers' Sustainable Environmental Attitude Scores According to Grade Level Variable*

f, $\overline{X}$ and sd Values				ANOVA Results				
Groups	**n**	$\overline{X}$	**sd**	**Source of Variation**	**Sum of Squares**	**df**	**Mean Squares**	**F**	**p**
1st grade	68	3.55	.55	Between groups	.42	3	.14	.50	.67
2nd grade	71	3.48	.56	Within groups	85.52	308	.27		
3rd grade	130	3.46	.48	Total	85.94	311			
4th grade	43	3.52	.53						

According to Table 12, as a result of the One-Way ANOVA test conducted to determine whether the sustainable environmental attitude scores of pre-service teachers differ significantly according to the grade level variable, it was revealed that there was no significant difference between the groups [$F_{(3,308)}$ =.50; p>.05]. In addition, it was observed that the mean of the sustainable environmental attitude scores of the 1st-grade students ($\overline{X}$ =3.55) was the highest, and the 3rd-grade students ($\overline{X}$ =3.46) were the lowest.

The t-test findings, which were conducted to determine the difference in pre-service teachers' sustainable environmental attitude scores according to the variable of whether taking an environment course or not, are given in Table 13.

Table 13: *T-Test Results of Pre-Service Teachers' Sustainable Environmental Attitude Scores According to The Variable of Whether Taking Environment Course or Not*

	Groups	**n**	$\overline{X}$	**sd**	**df**	**t**	**p**
Sustainable environmental attitude	Yes, I've.	175	3.49	.49	310	-.27	.78
	No, I've not.	137	3.50	.56			
The importance of the environment	Yes, I've.	175	3.72	.48	310	-.10	.91
	No, I've not.	137	3.73	.51			
Use of environmental resources	Yes, I've.	175	3.20	.67	310	-.31	.75
	No, I've not.	137	3.23	.72			
Consumption habits	Yes, I've.	175	3.53	.49	310	-.32	.74
	No, I've not.	137	3.55	.58			

According to Table 13, as a result of the t-test conducted to determine whether the sustainable environmental attitude scores of the pre-service teachers differ significantly according to whether taking environment course or not, it was revealed that there was no significant difference (t_{310}=-.27; p>.05). When the sub-dimensions of sustainable environmental attitudes were examined, it was determined that all sub-dimensions did not differ significantly according to whether taking environment course or not.

The t-test findings, which were conducted to determine the difference of pre-service teachers' sustainable environmental attitudes scores according to the variable of whether taking ethics course or not, are given in Table 14.

Table 14: *T-Test Results of Pre-Service Teachers' Sustainable Environmental Attitudes Scores According to The Variable of Whether Taking Ethics Course or Not*

	Groups	**n**	$\overline{X}$	**sd**	**df**	**t**	**p**
Sustainable environmental attitude	Yes, I've.	188	3.47	.49	310	-.88	.37
	No, I've not.	124	3.53	.56			
The importance of the environment	Yes, I've.	188	3.72	.48	310	-.13	.89
	No, I've not.	124	3.73	.51			
Use of environmental resources	Yes, I've.	188	3.18	.68	310	-.89	.37
	No, I've not.	124	3.26	.72			
Consumption habits	Yes, I've.	188	3.51	.49	310	-1.29	.19
	No, I've not.	124	3.59	.59			

According to Table 14, as a result of the t-test conducted to determine whether the sustainable environmental attitudes scores of the pre-service teachers differ significantly according to whether taking ethics course or not, it was revealed that there was no significant difference (t_{310}=-.88; p>.05). When the sustainable environmental attitude sub-dimensions were examined, it was seen that all sub-dimensions did not differ significantly according to whether taking ethics course or not.

The findings of the One-Way ANOVA test, which was conducted to determine the difference in pre-service teachers' sustainable environmental attitude scores according to the variable of relationship with environmental organizations, are given in Table 15.

Table 15: *One-Way ANOVA Test Results of Pre-Service Teachers' Sustainable Environmental Attitude Scores According to Relationship with Environmental Organizations Variable*

f, $\overline{X}$ and sd Values				ANOVA Results				
Groups	**n**	$\overline{X}$	**sd**	**Source of Variation**	**Sum of Squares**	**df**	**Mean Squares**	**F**	**p**
I don't know anything about organizations.	62	3.52	.61	Between groups	.41	2	.20	.74	.47
I know the names of organizations.	203	3.50	.53	Within groups	85.53	309	.27		
I'm a member of an organization/organizations	47	3.41	.33	Total	85.94	311			

According to Table 15, as a result of the One-Way ANOVA test, which was conducted to determine whether the sustainable environmental attitude scores of pre-service teachers differ significantly according to the variable of relationship with environmental organizations, it was revealed that there was no significant difference between the groups [$F_{(2,309)}$ =.74; p>.05].

The analysis results of the Pearson Correlation Coefficient for the relationship between pre-service teachers' environmental ethics awareness scores and their sustainable environmental attitude scores are given in Table 16.

Table 16: *Pearson Correlation Coefficient Test Results Between Pre-Service Teachers' Awareness of Environmental Ethics and Their Sustainable Environmental Attitudes*

	Environmental ethics awareness	The definition of environmental ethics	The measures to be taken for environmental ethics	The reasons for the emergence of environmental ethics	The purpose of environmental ethics	Sustainable environmental attitude	The importance of the environment	Use of environmental resources	Consumption habits
Environmental ethics awareness	1								
The definition of environmental ethics	.83**	1							
The measures to be taken for environmental ethics	.82**	.61**	1						
The reasons for the emergence of environmental ethics	.86**	.59**	.59**	1					
The purpose of environmental ethics	.75**	.66**	.46**	.54**	1				
Sustainable environmental attitude	.23**	.08	.27**	.28**	.04	1			
The importance of the environment	.31**	.17**	.30**	.34**	.16**	.86**	1		
Use of environmental resources	.16**	.03	.22**	.21**	-.03	.94**	.72**	1	
Consumption habits	.18**	.05	.22**	.23**	.03	.90**	.68**	.79**	1

n=312, **p<.01

When Table 16 is examined, it has been determined that there is a positive and significant relationship between the environmental ethics awareness of the pre-service teachers and their sustainable environmental attitudes and the importance of the environment, the use of environmental resources and consumption habits (p<.01). It has been determined that the relationship between environmental ethics awareness and sustainable environmental attitude is at a "weak" level in a positive direction (r=.23).

There was a "weak" positive relationship between environmental ethics awareness and the use of environmental resources (r=.16) and consumption habits (r=.18), which are sub-dimensions of sustainable environmental attitude, and a "moderate" positive relationship between the importance of the environment (r=.31). It was determined that there was a positive and significant relationship between the definition of environmental education sub-dimension and the importance of the environment (r=.17). It was observed that there is a positive and significant relationship between the measures to be taken for environmental ethics, which is one of the sub-dimensions of environmental ethics awareness, and the reasons for the emergence of environmental ethics, and all the sub-dimensions of the attitude towards sustainable environment (p<.01). In addition, it was determined that there was a positive (r=.16), "weak" relationship between the purpose of environmental ethics sub-dimension and the importance of the environment (p<.01).

The results of the regression analysis conducted to determine the level of predicting the sustainable environmental attitude of pre-service teachers' environmental ethics awareness are given in Table 17.

Table 17: *The Level of Prediction of The Sustainable Environmental Attitude of Pre-Service Teachers' Environmental Ethics Awareness*

	R	R^2	F	B	df	Beta	t	p
Environmental ethics awareness	.23	.05	23.04	.12	.02	.23	4.30	.00*

In Table 17, as a result of the simple linear regression analysis performed to determine to what extent the environmental ethics awareness of pre-service teachers predicts sustainable environmental attitudes, a relationship was found between environmental ethics awareness and sustainable environmental attitudes (R= .23, R^2= .05). It has been revealed that awareness of environmental ethics is a significant predictor of sustainable environmental attitude ($F_{(1-311)}$ = 23.04, p<.05). Environmental ethics awareness of pre-service teachers explains 5% of their attitudes towards sustainable environment. The significance test of the main predictor variable coefficient (B=.12) in the regression equation also revealed that the awareness of environmental ethics was a significant predictor (p< .01).

4. DISCUSSION and RESULTS

It was aimed to determine the environmental ethics awareness and sustainable environmental attitudes of pre-service teachers to reveal the teachers' access to the content specified in undergraduate education. It has been revealed that the environmental ethics awareness of the pre-service pre-school, primary school, science and elementary school mathematics teachers participating in the research is at a very high level. Similarly, in the study conducted by Tekiroğlu and Hayır Kanat (2021), it was concluded that social studies teachers' awareness of environmental ethics is high. It was revealed that the environmental ethics awareness of the pre-service teachers participating in the research differed significantly in favor of females according to gender, and their environmental ethics awareness did not differ significantly according to the department, grade level, taking environment and ethics courses at university or not, and relationship with environmental organizations. In Özer's (2015) study, which investigated the awareness levels of 3rd-grade and 4th-grade pre-service science teachers in different universities regarding environmental ethics, it was determined that the environmental ethics awareness of females participating in the research was higher than that of males. Similarly, Wongchantra et al. (2008), Nagra (2008), Keleş and Özer (2016) stated in their research that environmental ethics awareness is higher in favor of females. Ewen et al. (2015) examined attitudes, understanding, and environmentally-friendly preferences towards nature with teachers and pre-service teachers in Switzerland and France in the context of ecofeminism and stated that females have higher environmental sensitivity. In addition, according to the findings of the research, it was revealed that there was no significant difference between the groups according to the grade level variable in the environmental ethics awareness scores of the pre-service teachers, and it was seen that the environmental ethics awareness of the 4th-grade pre-service teachers participating in the research was higher than the 1st grade pre-service teachers. Similarly, in the study conducted by Saka et al. (2009), the approaches of the 4th-grade students of the education faculty towards environmental ethics were investigated and it was determined that the pre-service teachers studying at the primary school education department were more concerned with the environment. In addition, it was seen that the mean of the sustainable environmental attitude scores of the students studying at the science education department and the mean of the environmental ethics awareness scores of the students studying at the primary school education department were the highest, while the mean of both the environmental ethics awareness and sustainable environmental attitude scores of the students

studying at elementary school mathematics department was found to be the lowest. The fact that there is no difference between the environmental ethics awareness levels of the students of the science and primary school education departments in the education faculty may be related to the fact that students at both departments take environmental science and environmental education courses.

According to the findings of the study, it was revealed that the attitudes of the pre-service teachers towards the sustainable environment were high. Kahyaoğlu and Özgen (2011) stated in their study with pre-service teachers that the attitudes towards environmental problems were moderate. In addition, there are research studies in the literature studies in which attitudes towards the environment are low (Erol & Gezer, 2006; Şama, 2003).

According to the research findings, it has been revealed that the sustainable environmental attitudes of the pre-service teachers do not differ significantly according to gender, department, grade level, taking environment and ethics courses at university or not, and relationship with environmental organizations. Similarly, Akbaş (2007), in her study which aimed to determine the environmental and ecology concept knowledge and environmental sensitivity of pre-service science teachers, and to investigate whether these attitudes show a significant difference according to the demographic characteristics of the teachers, determined that gender did not affect the attitudes towards the environment. In her study, Aksu (2009) examined the attitudes of science teachers and primary school teachers towards environmental problems, and concluded that there was no significant difference according to teachers' gender, teaching experience, branches, membership of any environmental organization, and participation in environmental projects in and out of school. Similarly, in the study conducted by Bozdemir and Faiz (2018), it was determined that there was no significant difference in the scores of attitudes towards the environment among the students of primary school education, science education and social studies education departments. However, there are also research studies with different results in the literature. For example, Fernández-Manzanal et al. (2007) examined the attitude towards the environment in their study and stated that there was a significant difference in favor of females.

When analyzed according to grade levels, in the studies by Topaloğlu (2014) with pre-service science teachers and Öcal (2013) with pre-service social studies teachers in their studies examining attitudes towards environmental problems, it was concluded that the attitudes of pre-service teachers towards environmental problems did not differ according to their grade levels. Aydın and Ünaldı (2013) stated in their study with 1st-grade and 4th-grade pre-service geography teachers that the 1st graders' sustainable environmental attitude scores were higher than all other grades in terms of attitudes towards a sustainable environment. When the sustainable environmental attitude scores of the pre-service pre-school, primary school, science and elementary school mathematics teachers participating in this research were evaluated according to their grade levels, it was seen that the mean of the sustainable environmental attitude scores of the 1st-grade students was higher than the mean of the students' attitude scores from the other grade. It was concluded that this situation may be related to taking the environmental education course in the second semester of the first year. Considering the findings obtained in the research, undergraduate and graduate course curricula should be prepared by taking sustainable environmental education topics and courses into consideration, and educational environments should be organized that will allow pre-service teachers to learn by doing and experiencing, by including activities that will raise environmental awareness in the lessons.

According to the findings of the study, while the mean of the sustainable environmental attitude scores of male pre-service teachers was higher than that of female pre-service teachers, the mean of the

female teachers' attitude scores participating in the study in environmental ethics awareness was found to be higher than the mean of the male teachers' attitude scores. In addition, when the effect of pre-service teachers' taking environmental courses on environmental ethics awareness and sustainable environmental attitude levels was evaluated, it was found that there was no significant difference. Similarly, Deniş and Genç (2007) examined the environmental attitudes of students studying at primary school education department who took and did not take environmental science courses, and there was no significant difference in attitudes towards the environment between students who took and did not take the course.

In line with the last sub-problem of the study, it was determined that there was a low level of positive and significant relationship between the environmental ethics awareness of the pre-service teachers and their sustainable environmental attitudes, and that the environmental ethics awareness predicted the attitudes towards the sustainable environment at a low level. In a study conducted on the environment, Koçulu (2018) stated that there is a low-level positive and significant relationship between pre-service science teachers' behaviors towards environmental problems and their awareness of sustainable development.

As a result of the research, a positive and significant relationship was determined between the environmental ethics awareness of the pre-service teachers and their attitudes towards the sustainable environment and the importance of the environment, the use of environmental resources and consumption habits. Based on this result, it can be said that when the environmental ethics awareness of pre-service teachers increases, their attitudes towards a sustainable environment also increase, and when their awareness of environmental ethics decreases, their attitudes towards a sustainable environment will also decrease.

5. SUGGESTIONS

Based on the findings of the research, the following suggestions can be made:

- Course contents and activities in undergraduate education can be developed to raise awareness about environmental ethics and to develop an attitude towards a sustainable environment.
- It can be prepared by considering environmental education issues related to sustainable environment and environmental ethics awareness.
- Learning environments can be created to raise environmental ethics awareness, and in-service training can be prepared in the planning of activities.
- Revealing the underlying causes of environmental ethics awareness and attitudes towards a sustainable environment can guide the research studies of improving students' attitudes towards the environment.

Declaration of Contribution Rate of Authors

The authors contributed equally to the research.

Disclosure Statement

The authors report there are no competing interests to declare.

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