Investigation of Pre-service Classroom Teachers' Environmental Awareness and Attitudes

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Abstract

The purpose of the current study is to determine the pre-service classroom teachers' environmental awareness and attitudes and to elicit the relationship between their awareness levels and attitudes in terms of gender, grade level and state of membership to an environmental organization. The study was designed according to relational survey model. The study group of the current research is comprised of the pre-service classroom teachers attending two universities located in the Aegean Region in 2015-2016 school year. "Environmental Awareness Scale (EAWS)" developed by Okur (2012) and "Environmental Attitude Scale (EATS) were used to collect data. The collected data were analyzed with SPSS 20 program package by using descriptive statistics and Pearson coefficient. As a result of the analyses, it was found that the pre-service classroom teachers' environmental awareness levels and attitudes are high; there is a positive and medium correlation between their awareness levels and attitudes. Moreover, it was found that environmental awareness can predict 27% of environmental attitude. In light of these findings, it can be suggested that within the courses given throughout the undergraduate education, pre-service classroom teachers should be informed about environmental issues and encouraged to participate in environmentally-oriented social and cultural activities.

Keywords: Environmental education, pre-service classroom teacher, environmental awareness, environmental attitude

Introduction

As a result of industrial revolution, besides developing science and technology, environmental issues occupied an important position in social life. The first initiation related to environmental issues was taken by Public Health Committee in Massachusetts (The USA) in 1869 and a declaration about environmental problems was issued (Solmaz, 2010: 40). However, the concept of "environmental education" was first introduced in the Stockholm Conference in 1972. In the International Environmental Education Workshop held in Belgrade and in the Tiflis Declaration issued in 1978, emphasis was put on the necessity, importance and objectives of environmental education (Timur, Yılmaz and Timur, 2013: 192). With these initiations, the concept of environmental education came to the fore in the international arena. What is aimed with environmental education is not only inculcate information and skill but rather to create environmentally literate people who are aware of environmental problems and have attitudes and motivation to develop solutions to these problems

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and to prevent prospective problems. In order to be able to overcome environmental problems, individuals' behaviors towards environment should be changed and individuals should be encouraged not to view environment as something to be exploited for their ends rather as a precious asset worth being protected for the survival of man because for environmental education to achieve its goals, individuals' attitudes and behaviors towards environment need to be changed (Sinha, Jangira & Das, 1985: 8). Here, the attitudes towards environment are closely associated with affective characteristics as in educational objectives (Özçelik, 2010:15).

Schultz, Shriver, Tabacino and Khazian (2004: 31) define attitudes towards environment as the individual's beliefs about environmental activities and problems, the effect of these beliefs and the accumulation of behavioral intentions. As can be understood from this definition, environmental attitude is closely associated with environmental awareness. This same relationship can be seen in the definition of environmental awareness. According to Solmaz (2010), environmental awareness can be defined as being cognizant of what should be seen and known related to environment and the state of paying attention to a thing that should be grasped. In this regard, it cannot be expected from an individual to pay attention to something of which he/she is not aware and heard.

For the inculcation of environmental awareness and the development of positive attitudes towards environment, required importance should be attached to environmental education starting from early ages. Environmental education should be given by the family, society and school. Environmental education should start at home and in the close surrounding of the child and be further nurtured by schools (Çabuk, 2001: 40). Within the context of formal education, environmental education should be started as early as possible. Given that there is no special course for environmental education at the first level of schooling, that is elementary school, the classroom teacher should take the main responsibility for developing students' environmental awareness and attitudes.

In elementary education, environmental education is not considered to be a separate discipline; instead, it is incorporated into the curriculums of other courses; primarily that of life sciences. According to Ahi and Özsoy (2015: 34-35), the classroom teacher should put an emphasis on environmental education during classes and enable his/her students to live experiences related to issues of environment and sustainable development, provide them with opportunities to enhance their capacities and to construct their own knowledge and help them develop visions for sustainable future and effective solutions to environmental problems. As such, classroom teachers should provide the guidance for students to develop environmental awareness and positive attitudes.

For this process to achieve its objectives, the classroom teacher should have the necessary information, skills, awareness and attitudes related to environment and be able to impart required information and skills to students. Within the context of pre-service teacher education, in the classroom teacher education programs of education faculties, there is a special course with the name of environmental education. Within the context of this course, pre-service teachers are provided with opportunities to develop their skills, information, environmental awareness and attitudes that they can use in their professional lives.

As it takes long time to determine environmental behavioral changes in individuals through educational research, indirect changes are tried to be determined by means of the observation of various variables such as environmental attitudes, awareness, sensitivity (Okur-Berberoğlu and Uygun, 2012: 460). On the basis of the fact that for helping individuals accomplish behavioral changes, environmental awareness and

attitudes are important, it can be argued that classroom teachers' having adequate level of environmental awareness and positive environmental attitudes is of great importance for them to get their students to achieve the environment-related objectives in curriculums. Therefore, it seems to be important to investigate the environmental awareness and attitudes of pre-service teachers who will be the actual teachers of future.

Thus, the purpose of the current study was set to be to determine the pre-service classroom teachers' environmental awareness and attitudes and to elicit the relationship between their awareness levels and attitudes in terms of gender, grade level and state of membership to an environmental organization. To this end, answers to the following questions were sought.

1. What are the pre-service classroom teachers' environmental awareness and attitude levels?

2. Is there a significant relationship between the pre-service teachers' environmental awareness and environmental attitudes?

3. Do the pre-service teachers' environmental awareness and attitudes vary significantly depending on the variables of gender, grade level and the state of membership to an environmental organization?

4. What is the extent to which the pre-service teachers' environmental awareness predicts their environmental attitudes?

Methodology

Research Model

In the current study conducted through quantitative method, one of the general survey models, relational survey model was used. According to Karasar (1995: 81-82), relational survey studies can be divided into two as correlation studies and comparative studies. In correlation studies, the aim is to determine the existence of covariance between two or more variables and/or the degree of this covariance; on the other hand, in comparative studies, the aim is to determine whether the dependent variable differs among the groups constructed according to independent variables.

Participants

The study group of the current research is comprised of the pre-service classroom teachers attending the classroom teacher education departments at the education faculties of two universities located in the Aegean Region in 2015-2016 school year. In the selection of the participations, availability sampling method was used. Demographic features of the participating pre-service teachers are given in Table 1. .

Table 1.

Demographic Features of the Participants

Variables		University A		University B		Total	
		n	*%*	*n*	*%*	*n*	*%*
Gender	Female	126	58,9	88	41,1	214	100
	Male	45	40,5	66	59,5	111	100
	Total	171	52,6	154	47,4	325	100
Grade Level	1st grade	69	69,9	39	36,1	108	100
	2nd grade	38	50,7	37	49,3	75	100
	3rd grade	41	54,7	34	45,3	75	100
	4th grade	23	34,3	44	65,7	67	100
	Total	171	52,6	154	47,4	325	100
Environment Organization	Member	18	46,2	21	53,8	39	100
	Nonmember	153	53,5	133	46,5	286	100
	Total	171	52,6	154	47,4	325	100

Data Collection Tools

In the collection of the data, "Environmental Awareness Scale (EAWS) developed by Okur (2012) and "Environmental Attitude Scale (EATS)" were used. EAWS and EATS are five-point Likert-type scales. While EAWS does not include any inversely worded items, in EATS, items 3, 6, 7, 9, 10, 17, 18, 19, 21 and 22 are inversely worded items. Goodness-of-fit values for EAWS and EATS are given in Table 2 (Berberoğlu-Okur, 2012).

Table 2.

Goodness-of-fit values obtained as a result of exploratory and confirmatory factor analyses of the Environmental Awareness and Environmental Attitude Scales

Analyses		Recommendation Scores	EAWS	EATS
Exploratory Factor Analyses	Number of item		18	22
	Number of factor		1	1
	Cronbach alpha	≥ 0,80	0,858	0,800
	KMO	Close to 1	0,895	0,832
	Bartlett test	Close to 0	0,000	0,000
Confirmatory Factor Analyses	$X2/df$	3-5	3,39	3,23
	p	<0,05	0,000	0,000
	RMSEA	≤ 0,08	0,08	0,08
	SRMR	≤ 0,08	0,05	0,07
	GFI	0,80- 0,89	0,86	0,84
	AGFI	0,80- 0,89	0,82	0,80

Moreover, reliability coefficient was calculated to be 0.95 for EAWS and 0.82 for EATS.

Data Analysis

In the analysis of the data, SPSS 20 program package was used. The scale items can be responded by marking one of the options ranging from 5 "Strongly Agree" to 1 "Strongly Disagree"; inverse items in EATS are scored as 5 "Strongly Disagree" to 1 "Strongly Agree". The lowest score to be taken from EAWS is 18 and the highest score is 90. The lowest score to be taken from EATS is 22 and the highest score is 110. In the determination of the pre-service classroom teachers' environmental awareness and attitude levels, descriptive statistics were used; for the elicitation of the relationship between them, Pearson Product-Moment Correlation and for the investigation of the extent to which awareness predicts attitude, regression analysis was used. The other ranges of values used in the interpretation of the scores taken from EAS and EATS are presented in Table 3.

Table 3.

Ranges of Values used in the Interpretation of the Scores taken from the Environmental Awareness and Attitude Scales

Environmental Awareness Scale		Environmental Attitudes Scale	
Low awareness score	18-41	Low attitudes score	22-50
Medium awareness score	42-66	Medium attitudes score	51-79
High awareness score	67-90	High attitudes score	80-110

The ranges of values of the scales shown in Table 3 were determined by dividing the score range between the lowest and highest scores to be taken from the scales into three equal parts. Thus, a score ranging from 18 to 41 was interpreted to be low, a score ranging from 42 to 66 as medium and a score ranging from 67 to 90 as high for EAWS. For EATS, a score ranging from 22 to 50 was interpreted to be low, a score ranging from 51 to 79 as medium and a score ranging from 80 to 110 as high.

Findings

Table 4.

Descriptive Statistics related to The Pre-service Classroom Teachers' Environmental Awareness and Attitudes

Scale	*n*	Min.	Max.	$\overline{X}$	*SD*	Score
Environmental Awareness	325	42	111	80,14	10,71	High
Environmental Attitudes	325	56	110	80,67	12,3	High

When Table 4 is examined, it is seen that the lowest score taken from the environmental awareness scale by the pre-service teachers is 42 and the highest score is 111. From the environmental attitude scale; on the other hand, the lowest score taken is 56 and the highest score is 110. When the means of the scores taken from the scales by the pre-service teachers are examined, it is seen that the mean score taken from the environmental awareness scale is high ($\overline{X}$=80.14) and the mean score taken from the environmental attitude scale is high, too ($\overline{X}$=80.67).

Table 5.

Pearson Correlation Test Results related to the Relationship between the Pre-service Teachers' Environmental Awareness and Environmental Attitudes

Scale	n	$\overline{X}$	SD	R	p
Environmental Awareness	325	80.14	10.71	.523	*.000*
Environmental Attitudes	325	80.67	12.3		

When Table 5 is examined, it is seen that there is a significant relationship between the pre-service teachers' environmental awareness and environmental attitudes (p<.05). When the direction and level of this relationship was examined, it was found that there is a positive and medium level relationship (r = .523).

Table 6.

Independent-samples t-test Results related to whether the Pre-service Classroom Teachers' Environmental Awareness and Attitudes Vary Significantly depending on the Variable of Gender

Scale	Gender	n	$\overline{X}$	SD	t	df	p
Environmental Awareness	Female	214	80.04	10.54	-378	323	.705
	Male	111	80.52	11.42			
Environmental Attitudes	Female	214	81.56	12.44	1.805	323	.072
	Male	111	78.97	11.89			

When Table 6 is examined, it is seen that the mean scores taken by the pre-service teachers from both the environmental awareness scale and the environmental attitude scale do not vary significantly depending on gender (p>.05). In light of this finding, it can be argued that the pre-service teachers' gender does not have a significant effect on either their environmental awareness or environmental attitudes.

Table 7.

One-way Variance Analysis Results related to whether the Pre-service Classroom Teachers' Environmental Awareness and Attitudes Vary Significantly depending on the Variable of Grade Level

	Descriptive Scores				ANOVA Results					
Scale	Group	n	$\overline{X}$	SD	Source	SS	df	MS	F	p
EAWS	1st grade	108	78.61	11.89	B.Groups	714,150	3	238.050	2.046	.107
	2nd grade	75	79.45	11.56	W.Groups	37345.038	321	116.340		
	3rd grade	75	82.24	10.25	Total	38059.188	324			
	4th grade	67	81.34	8.28						

	Descriptive Scores				ANOVA Results					
Scale	Group	n	$\overline{X}$	SD	Source	SS	df	MS	F	p
EATS	1st grade	108	81.76	10.74	B.Groups	4677.432	3	1559.144	11.285	*.000*
	2nd grade	75	77.21	10.83	W.Groups	44349.645	321	138.161		
	3rd grade	75	86.37	13.88	Total	49027.077	324			

| **4th grade** | 67 | 76.41 | 11.7 |

When Table 7 is examined, it is seen that while the pre-service classroom teachers' scores taken from EAS do not vary depending on their grade level($p>.05$), their scores taken from EATS vary significantly depending on grade level ($p<.05$). Thus, in order to determine the source of the difference, confirmatory analyses (posthoc) were conducted. First, variance homogeneity was tested and variances were found to be not homogenous ($p<.05$).Therefore, Tamhane's T2 test was run and the obtained data are presented in Table 8.

Table 8.

Results of Tamhane's T2 Test Conducted to Determine between Which Groups the Environmental Attitude Scores Differ Significantly depending on the Variable of Grade Level

Groups (i)	Groups (j)	$\bar{x}_i - \bar{x}_j$	$Sh_{\bar{x}}$	p
1st grade	2nd grade	4.555	1.766	.086
	3rd grade	-4.604	1.766	.081
	4th grade	5.350*	1.827	*.037*
2nd grade	1st grade	-4.555	1.766	.086
	3rd grade	-9.60*	1.919	*.000*
	4th grade	.795	1.975	.983
3rd grade	1st grade	4.604	1.766	.081
	2nd grade	9.160*	1.919	*.000*
	4th grade	9.955*	1.975	*.000*
4th grade	1st grade	-5.350*	1.827	*.037*
	2nd grade	-.795	1.975	.983
	3rd grade	-9.955*	1.975	*.000*

When Table 8 is examined, it is seen that the pre-service teachers' mean scores taken from the environmental awareness scale vary significantly between the first-year and fourth-year students in favor of the first-year students ($p<.05$); and between the third-year, second-year and fourth-year students in favor of the third-year students ($p<.05$).

Table 9.

Independent-samples t-test Results related to whether the Pre-service Classroom Teachers' Environmental Awareness and Attitudes Vary Significantly depending on the Variable of the State of Membership to an Environmental Organization

	Variables	*n*	$\bar{X}$	*SD*	*T*	*df*	*p*
Environmental Awareness	Member	39	78.07	12.95	-1.284	323	.200
	Nonmember	286	80.42	10.36			
Environmental Attitudes	Member	39	80.41	13.97	-.144	323	.886
	Nonmember	286	80.71	12.08			

When Table 9 is examined, it is seen that the pre-service teachers' mean scores taken from EAWS and EATS do not vary significantly depending on the state of membership to an environmental organization (p>.05). Thus, it can be argued that membership to

an environmental organization does not have a significant effect on the pre-service teachers' environmental awareness and attitudes.

Table10.

Simple Linear Regression Analysis Results related to the Extent to Which the Pre-service Teachers' Environmental Awareness Predict their Environmental Attitudes

Dependent Variable	Independent Variable	β	Standart Eror $_B$	Standardized β	t	F
Attitudes	Awareness	.600	.054	.523	11.018	121.390
			R= .523	R^2=.273	p= .000	

When Table 10 is examined, it is seen that there is a positive and medium level correlation between the pre-service teachers' environmental awareness and environmental attitudes (R=.523; p<.05) and the pre-service teachers' environmental awareness predicts nearly 27% of the total variance of their environmental attitudes (R^2 =.273).

Discussion

At the end of the study, it was found that the pre-service classroom teachers' environmental awareness and attitudes levels are high. The attitudes possessed by teachers are of great importance in terms of their making connections to environmental issues in their classes (Kim &Fortner; 2006: 16).In this connection, possession of high levels of environmental awareness and attitudes by the pre-service classroom teachers who will educate future generation with environmental sensitivity seems to be a positive finding of the study.

Yumuşak, Sargın, Baltacı and Kelani (2016) found that the pre-service teachers' environmental awareness level is high. When other studies conducted on pre-service teachers are examined, it is seen that there are some studies reporting medium level of environmental attitudes (Güven; 2013; Kahyaoğlu and Özgen, 2012; Polat and Kırpık, 2013) or high level of environmental attitudes (Aksu ve Erduran, 2009; Özsoy, 2012). Thus, this finding of the study concurs with the findings reported in the literature. On the other hand, there are some studies in the literature reporting that pre-service teachers' environmental attitudes are low (Erol and Gezer, 2006; Şama, 2003).In a study, Erol (2005) investigated the second-year pre-service classroom teachers' interest in and attitudes towards environmental problems and found that the pre-service teachers' attitudes towards environment and environmental problems are low. Özsoy (2012) conducted a study on pre-service teachers' environmental awareness and found that the participants have a medium level awareness.

In the current study, it was also found that the pre-service classroom teachers' environmental awareness and attitudes do not vary significantly depending on gender. When the research focusing on pre-service teachers' environmental attitudes is examined, it is seen that there are some studies reporting, parallel to this finding of the current study, that gender does not have a significant effect on environmental attitudes (Aksu and Erduran, 2009; Aslan, Uluçınar-Sağır and Cansaran, 2008).However, in great majority of the studies, significant gender-based differences in environmental

awareness and attitudes in favor of women have been reported. Researchers such as Ek, Kılıç, Öğdüm, Düzgün and Şeker (2009); Erol and Gezer (2006); Kahyaoğlu and Özgen (2012)reported that women have more positive attitudes towards environment than men and the difference is significant. In a study by Çelikler and Aksan (2015), in terms of environmental awareness, a significant difference was found in favor of women.

While no significant difference was found between the pre-service classroom teachers' awareness levels in terms of grade level, a significant difference was found in their environmental attitudes between the first-year students and the fourth-year students in favor of the first-year students and between the third-year students, the second-year students and the fourth-year students in favor of the third-year students. In their study investigating the third-year and fourth-year students' environmental awareness of environmental problems, Çelikler and Aksan (2015) found a significant difference in favor of the fourth-year students.

No significant difference was found in the pre-service classroom teachers' environmental awareness and attitude mean scores depending on the state of membership to an environmental organization. However, Eket al. (2009) determined that participation in an environmental activity or taking an environmental course significantly affected the pre-service teachers' environmental attitudes. This difference might be because the environmental organization membership of the participants of the current study is not as much active as to affect their awareness or attitudes.

It was finally determined that there is a positive and medium level correlation between the pre-service classroom teachers' environmental awareness and attitude mean scores and their environmental awareness can explain 27% of the variance in their environmental attitudes. When the literature is examined, it is seen that environmental awareness, environmental attitudes, sensitivity towards environmental problems have been found to be related to each other. Determination of environmental awareness is viewed to be important in terms of developing positive environmental attitudes and behaviors (Ünver, Avcıbaşı and Kızılcık-Özkan, 2015: 283). Okur-Beberoğlu and Uygun (2012) found a high level of correlation between environmental awareness and attitudes.

Conclusion

The findings obtained in the current study can be summarized as follows:

1. The pre-service classroom teachers' environmental awareness and attitude levels were found to be high.

2. The gender variable was found to be not leading to a significant difference in the pre-service classroom teachers' environmental awareness and environmental attitude mean scores. In terms of the grade level variable, while no significant difference was found in the pre-service classroom teachers' environmental awareness, a significant difference was found between the first-year students and the fourth-year students in favor of the first-year students and between the third-year students, the second-year students and the fourth-year students in favor of the third-year students in terms of their environmental attitudes.

3. The state of membership to an environmental organization was found to be not resulting in a significant difference in the pre-service classroom teachers' environmental awareness and attitude mean scores.

4. It was determined that there is a positive and medium level correlation between the pre-service classroom teachers' environmental awareness and environmental attitudes and the pre-service classroom teachers' environmental awareness predicts their environmental attitudes to some extent.

Recommendations

On the basis of the finding that environmental awareness and attitudes are positively correlated, throughout the undergraduate education of pre-service teachers; besides the required environmental education course, some elective environmental education courses can be offered to pre-service teachers, thus, their environmental awareness can be improved more.

It should be taken in mind that the environmental education given to pre-service teachers will have direct impacts on their prospective students; thus, this education should be connected with the real life. To this end, the existing environmental education courses should be focused more on practice and pre-service teachers should be encouraged to participate in environmental activities. More social activities related to environment should be incorporated into the curriculums of teacher training programs of universities. By promoting pre-service teachers' participation in environmental activities, their environmental awareness and attitudes can be improved.

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Determination of Pre-service Teachers' Awareness of Plants

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Abstract

Human beings do not usually recognize plants although they exist widely in their environment. This condition has been described as plant blindness in literature. The main purpose of this study is to examine pre-service elementary teachers' awareness of plants. Moreover, the study examined from which sources student-teachers gained knowledge about plants. This study was designed as a survey model. The data of the study were obtained from the questionnaire consisting of two open-ended questions. The study group of this research consisted of 308 student-teachers. The participants receive teacher training at a state university located in Turkey's Aegean coast. Frequencies and percentages were calculated for the data analysis. The results of this study revealed that pre-service elementary teachers have got symptoms of plant blindness. The source of knowledge for plants is not usually formal science education. In addition to this, the results of this study suggest that student-teachers have a tendency to form aliveness concept with animistic and anthropocentric perspectives. In the light of these results, it is highlighted that there is a need to support pre-service elementary teachers' awareness of plants to prevent young children's plant blindness.

Keywords: plant blindness, plant awareness, plants.

Introduction

Plants are very important for ecosystems. Plants produce energy necessary to maintain their vital activities by performing photosynthesis. The food produced by plants is the first level of food chain in an ecosystem. In addition to this, photosynthesis forms the basis of carbon-oxygen-cycle in nature. In other words, all living things need plants for two vital activities like nourishment and respiration. Moreover, plants are home for many living beings like some birds, insects, and etc. Plants prevent erosion and also help reduce the damage caused by the wind in the environment. Man used plants to treat many illnesses. According to the data of World Health Organization (WHO), nearly 20.000 different plant species have been used for medicinal purposes (Toksoy, Ayyıldız, & Gümüş, 2003). Plants are raw materials for soap, varnish, oil paint, cream and many industrial fields. Due to these reasons, the whole life depends on animals and it has become a motto (Wandersee, Clary, & Guzman, 2006).

People do not know for sure how many living species exist on Earth. However, it is estimated that more than 10 million living creatures exist on the planet. 6.7 million of species are invertebrates (e.g, insects, arthropoda, mollusks). It is estimated that there are 5 million insect species. Nearly 80.00 of species are vertebrates (e.g, mammals,

birds, and reptiles). 5.500 of the vertebrates are mammals. It is estimated that nearly 400.00 plant species exist on the planet. 350.00 of plant species are flowering plants (angiosperms) (Chapman, 2009). These numbers demonstrate the importance of plants for biodiversity of the planet.

Turkey has a rich vegetation and high endemism due to its climate, rugged topography, high altitude, and ecosystem diversity (e.g, forest, steppe, coast, sea and wetland). Turkey hosts more than 10.00 plant species. More than 3.000 of plant species (approximately 35%) that grow in our country are endemic plants. Three quarters of all plant species existing in Europe also grow in Turkey. Wild relatives of many agricultural plant species like cherry, apricot, almond, fig, wheat, chickpea, lentil, apple, pear, and chestnut are of Turkish origin. Turkey is also home of many ornamental plant species (Organisation for Economic Co-operation and Development [OECD], 2008).

Many plant species nearly all over the word are under serious threats due to the reasons like deforestation, air, water, and land pollution, unconscious industrialization, overgrazing, and rapid population growth. According to the Living Planet Report published by The International Union for Conservation of Nature (IUCN) in 2012, the biodiversity of the world declined by 30% between 1970 and 2008 (Living Planet Report, 2012). IUCN prepares the list of the animal and plant species that became extinct and are endangered and this list is known as The Red List. The Red List is the world's most comprehensive inventory of global conservation status of biological (animals and plants) species. According to The IUCN Red List of Threatened Species published in 2006, 16.118 biological species are endangered in the world. More than 13 plant species became extinct in the 19th and 20th centuries in Turkey and 8 of these plant species are endemic. 250 plant species are likely to become endangered (The Ministry of Environment,2001; İskender, Zeynalov, Ozaslan, İncik, & Yayla, 2006). These data reveal that our world and country have become uninhabitable places. The governments, national, and international organizations develop strategies to conserve environment. But, as stated by Fancovicova and Prokop (2011), if a society is not aware of floristic richness of its environment, it is almost impossible to love and conserve that natural richness.

Human beings are unable to recognize or see plants despite their common existence around them. Wandersee and Schussler (2001) conceptualized the term plant blindness to describe the people's lack of awareness of plants and neglect of plants. Many studies in literature exhibit that mostly children and adults suffer from the symptoms of plant blindness. For example, Gatt, Tunnucliffe, Borg and Lautier (2007) reported that 4 - 5 year old Maltese children were not as enthusiastic as they were about animals while they were talking about plants. Patrick and Tunnicliffe (2011) focused on 4 - 10 year old American and English children's naming animals and plants around them in their study. The results of this study revealed that beginning at very early ages, children recognize the animals in their environments and they named animals at the age of 8. However, children could not achieve the same success with the plants. Tunnicliffe (2001) analyzed the talk among the 7-11 year old children visiting a botanical garden throughout their visit. It was found in this study that only 7% of the talk was about the plants. Yorek, Şahin and Aydın (2009) carried out a study with the 9th grade students and they asked the participants to write 10 living things that come to their minds. The findings of their study revealed that students did not include any plants in their lists. Schussler and Olzak (2008) in their study compared the botany students and psychology students' recall of plant and animal images at college level. The results of their study demonstrated that taking a botany course was not effective in knowing plants by name. Moreover, the results of this study revealed that botany

education was not adequate to place plants in children's conscious perceptions. There also other studies which suggest that schools are usually not children's only source of knowledge about plants (e.g. Gatt et.al., 2007; Jewell, 2002; Patrick & Tunnicliffe, 2011; Tunnicliffe, 2001). Due to all these reasons, there is a need to prevent plant blindness beginning at very early ages (Wandersee, Clary, & Guzman, 2006) and adult education is very important to achieve this purpose (Gatt et al., 2007). It is not enough but required for teachers not to have the symptoms of plant blindness to promote children's awareness of plants. The main purpose of this study is to determine the pre-service elementary teachers' awareness of plants. The study sought answers to these two research questions:

1. What is pre-service elementary teachers' awareness of plants like?
2. From which sources do pre-service elementary teachers acquire knowledge about plants?

Methodology
The purpose of this study is to examine pre-service elementary teachers' plant blindness. Survey model was used in the research study. Survey is used to describe and explain the characteristics of a phenomenon or a population being studied in detail. In this model, a phenomenon or a population being studied cannot be manipulated. The population or phenomenon is examined under their natural conditions (Çepni, 2007). There are other research methods which examine the existing situation and present it as is. But, surveys are used to qualify the characteristics of an extensive sampling. In this method the main purpose is to make generalizations by examining a large group (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2014). Because many pre-service elementary teachers' existing conditions about plant blindness were examined,   this study was designed as a survey model.

Working Group

The working group of this research study consisted of 308 student-teachers studying in a university located in Turkey's Aegean coast. The university where the study was carried out is a state university. The university's faculty of education has been training teachers for 16 years. The faculty of education has undergraduate, masters and doctoral programs. Primary education teacher training lasts four years in Turkey. All of the participants in the study were studying in primary education teacher training program in education faculty. Student-teachers studying between the 1st and 4th grades participated in the study. There were between 80 and 95 students in each education level. However, the data could not be gathered from nearly 10-15 student-teachers in each education level. The information about the working group of the research was presented in Table 1.

Table 1.
Demographic characteristics of the pre-service elementary teachers in the working group

Grade	Girls		Boys		Total	
	f	%	f	%	f	%
Grade 1	60	19.5	18	5.8	78	25.3
Grade 2	59	19.1	21	6.8	80	26.0
Grade 3	52	16.9	19	6.2	71	23.1
Grade 4	55	17.9	24	7.8	79	25.6
Total	226	73.4	82	26.6	308	100.0

Gathering Data

The data of the study were obtained via questionnaire consisting of two open-ended questions. The first question was "Write down the names of 10 living things that come to your mind first." This question was adapted from the study of Yoreket al. (2009). Yoreket al. (2009) in their study aimed at exploring how the 9th grade students composed their understanding of living things. Their questionnaire consisted of other questions apart from this question. Based on the findings obtained from this question in the questionnaire, they stated that their participants were likely to have the symptoms of plant blindness. Due to this reason, it was considered that this question could be used to identify the participants' plant blindness. Permission was taken from Yorekto use this question. Moreover, his opinion was asked whether or not this question could be practised with the pre-service elementary teachers. The participants were asked in the second question of the questionnaire to write their source of knowledge for every living thing they wrote. The questionnaire questions were put in a table in order to gather data thoroughly. The participants wrote down the names of living things that came to their minds in one of the columns of the table. They wrote down from which source they gained knowledge about that living thing on the right column of this column. The data collection tool was introduced to take opinions of a team of experts, consisting of a biology educator, a science teacher, and a language expert. The piloting of the questionnaire was carried out with six student-teachers and three teachers who did not participate in the study. This questionnaire was used by Çil (2015) in another study.

The questionnaire was implemented by the second author of this study. No time limit was given to complete the questionnaire. The participants answered the questions in the questionnaire within the time they needed. The participants usually finished the questionnaire in 10-15 minutes. The data were collected in 2015-2016 academic year.

Analyzing Data

Content analysis was used for the analysis of the qualitative data gathered from this research study. Content analysis is to make inferences based on coding and categorization of qualitative data (Stemler, 2001; Yıldırım & Şimşek, 2005). The responses given to the first question of the questionnaire were analyzed to find answers to the first research question. While analysing the first question of the questionnaire, firstly frequencies and percentages for each living thing in the participants' lists were calculated. The most frequently and the least appreciated living things were tried to be determined by the participants with this way. Then, the living things written down by the participants were classified into kingdoms of living things. There were five kingdoms in participants' list of living things and these were animals, plants, fungi, protists, and monerans. Appreciation frequency and percentages for each kingdom was calculated. Finally, the perspectives the participants used to make the list of living things were tried to be identified. In this process, a method similar to Yörek, Ugulu and Aydın (2016) was followed. The participants who ranked human beings as first in the list of living things and who wrote mostly animals in the rest of the list were categorized as the ones who had anthropocentric perspective. The ones who wrote animals in the first five ranks of the living things' list were categorized as the ones who had animistic perspective. Frequencies and percentages of anthropocentric and animistic categories were calculated.

The responses given to the second question in the questionnaire were analyzed to find answers to the second research question. The participants were asked to write where they learned about each living thing in their lists with this question of the questionnaire.

While analyzing this question, firstly all of the sources of knowledge expressed by the participants were listed. Then, similar knowledge sources were integrated. For example, such expressions as they existed where I lived and I saw it were integrated. Then, these sources of knowledge were tagged. For example, the sources of knowledge mentioned a short time ago were tagged as real-life experiences. Frequencies and percentages of knowledge sources were calculated.

The research data were analyzed by the second author of this paper. The analyses were checked by the first author.

Findings

This study sought answers to two research questions. The findings obtained for each research question were given under separate titles.

Findings related to the pre-service teachers' plant awareness
The responses of the participants to the first question of the data collection tool were analysed in three steps in order to finds answers to this research question. The findings obtained were presented in table 2, 3, and 4. Table 2 presents the most frequently appreciated living things by the pre-service elementary teachers.

Table 2.
Pre-service elementary teachers' most frequently appreciated living things

Living thing(s)	f	%
Dog	205	66.5
Cat	200	64.9
Bird	120	38.9
Lion	108	35.0
Snake	102	33.1
Fish	83	26.9
Human	71	23.0
Tiger/Cheetah	35	21.7
Cow	64	20.7
Horse	60	19.4
Elephant	56	18.1
Chicken	54	17.5
Monkey/Mouse	46	14.9
Daisy*	43	13.9
Tree*/Rose*/Rabbit/Ant	41	13.3
Dolphin	37	12.0
Crocodile	36	11.6
Turtle/Whale	32	10.3
Sheep/Squirrel	29	9.4
Worm/Bear/Penguin	27	8.7
Donkey	26	8.4
Butterfly/Goat	25	8.1
Shark/Bee/Chamaeleon	22	7.1
Flower*/Eagle/Insect/Wolf	21	6.8
Octopus/Housefly	19	6.1
Fox/Pigeon/Lizard	17	5.5
Equus/Deer/Parrot/Panda	16	5.1

*Name of plant specimen. The table showed 5% and more value.

When Table 2 is examined, it is seen that dog and cat take place in more than half of the participants' list of ten living things. A bird is included in nearly 40% of participants' favourite living thing's list. There are no plants among the ten living things with the highest frequency. The plant with the highest frequency is daisy. A daisy is included in only 14% of the participants' favourite living thing's list. Table 3 summarizes the distribution of pre-service elementary teachers' list of ten living things considering the kingdoms of living things.

Table 3.
Pre-service elementary teachers' most frequently appreciated kingdoms of living things

Kingdoms of living things	f	%
Kingdom of animals	44	92
Kingdom of plants	4	8
Kingdom of fungi	0	0
Kingdom of protists	0	0
Kingdom of monerans	0	0
Total	48	100

When Table 3 is examined, it is revealed that there are 48 different living things in participants' list and only 8% of them are plants. The perspectives pre-service elementary teachers used to approach the aliveness concept were presented in Table 4.

Table 4.
Pre-service elementary teachers' animistic and anthropocentric perspectives

Perspective	f	%
Animism	125	40.5
Anthropocentrism	35	11.3
Total	160	51.8

Table 4 shows that there are animals in the first five ranks of the 40% of participants' list of ten living things. Human is ranked first in 11% of participants'   favourite list of living things.

Findings related to the pre-service elementary teachers' source of knowledge about plants

Table 5 presents the sources of knowledge pre-service elementary teachers gained knowledge about plants.

Table 5.
Sources of pre-service elementary teachers' knowledge about plants

Source of knowledge	f	%
Real-life experiences	173	56.1
Formal science teaching	18	5.8
Television	14	4.5
Book	10	3.2
Documentary	8	2.5
Magazines	6	1.9
Parents	3	0.9
Internet	2	0.6

When Table 5 is examined, it is found that more than half of the participants' sources of knowledge about plants are their real-life experiences. The ratio of formal science education which pre-service elementary teachers got throughout their lives is only 6% for being a source of knowledge about plants. The ratio of the parents and internet for being source knowledge about plants is not even 1%.

Discussion

Plants are very important for the whole ecosystems on the planet. Because mankind uses nature roughly nearly everywhere in the world, the floristic richness is under threat. There is need for individuals to conserve floristic diversity. The aim of this study is to examine pre-service elementary teachers' awareness of plants.

One of the main qualities of plant blind individual is that he does not take notice of plants around him (Wandersee & Schussler, 2001). Due to the altitude differences in short distances, climate change from the coast to the inland, and its position between Europe and Asia, the country where this study is carried out has a rich flora and high endemism. It is determined that the city centre where the university is located has 86 family, 327 genus and 555 species in its flora. Some plants found in the city centre flora are used in dyeing. Madder (rubia tinctorum) and weaving have an important place in region's art, culture, and tourism (Etikan, Sevinç, & Balcı, 2009). Oil has been produced from many plants in the city centre flora. This oil is used for making soap, cream, and so on (Küçükala, Durmuşkahya, & Koray, 2010). The university campus where this study was carried out has large forest and green areas. Ceylan (2009) carried out a study to determine university campus flora and identified 62 family and 233 genus, 275 species, 72sub-species and 39 varieties. When the responses to the first question of the questionnaires used to gather data in this research study were evaluated, it was found that unfortunately the pre-service elementary teachers' list of living things did not include examples from this rich flora (Table 2).

Secondly, the pre-service elementary teachers' list of living things mostly involved animals (Table 2 and 3). Most of the pre-service elementary teachers' list of living things included animals in the first five ranks, in other words, they approach the concept of aliveness with animistic perspective (Table 4). This condition suggests that pre-service elementary teachers are more interested about learning animals than plant and they neglect plants. This is one of the characteristics of plant blind individuals.

In addition to these, the pre-service elementary teachers' lists of living things include flower and tree (Tablo 2). It can be stated that the pre-service elementary teachers perceive all of the flowering plants as only one plant. Similarly, it can be mentioned that they also perceive different tree species as only one plant. Wandersee and Schussler (1999) suggest that people's identification of many plant species as single plant is due to their perception of them as background. It is like people's seeing the forest as a whole but not being able to realize the diversity in it. And this is one of the signs of inability to see plants. Due to all these reasons, it can be argued that the pre-service elementary teachers suffer from the symptoms of plant blindness. This result is similar to the results of research studies which interpreted young children (Gatt et al., 2007; Fancovicova & Prokop, 2010; Kinchin, 1999; Patrick & Tunnicliffe 2011) and college students' (Schussler & Olzak 2008) awareness of plants in literature. Moreover, it is similar to the results of the studies which examined the high school students' cognitive structures about aliveness concept (Yorek et al., 2009; Yorek et al., 2016).

In literature people's neglect of plants and being more interested in learning about animals were tried to be explained depending on different reasons. These reasons

can be grouped into three categories. The first reason is the functions of brain and the underlying ways for its perception. Human brain perceives different things in its environment. Plants are not usually different or extraordinary things (Strgar, 2007). The second reason is the concrete features that living things have. For example, while animals move suddenly, plants are perceived as stationary by the people (Allen, 2003; Tunnicliffe, 1996) and animals have features like communicating with sound and reacting to people (Kinchin, 1999; Strgar, 2007). The third reason is science and/or biology education given in schools. Plants are frequently emphasized in the curricula but teachers are zoochauvinists in biology teaching in their classes. Moreover, teachers spare less time for teaching plants. While giving examples from living things, they rarely use plants. Course books include less information about plants and when compared to animals, they provide images and specific labels for fewer plants (Schussler & Olzak, 2008). It seems that it is not likely to change the concrete features the livings beings possess. Thus, it can be a good solution to design and implement instructions which focus on plants' extraordinary features and emphasise all the kingdom of living things together to prevent plant blindness.

The second research question of this study is to determine from which sources the pre-service elementary teachers learned about the plants included in their list of ten favourite living things. The findings of this research study indicate that the pre-service elementary teachers' source of knowledge about plants is not usually science education which they take throughout their lives in schools. The pre-service elementary teachers usually gain their knowledge about plants via their real- life experiences (Table 5). These results are similar to the results in literature (Gatt et al., 2007; Jewell, 2002; Patrick & Tunnicliffe, 2011; Tunnicliffe, 2001; Tunniciiffe & Reiss, 2000). The point that draws attention here is that as mentioned before, the place where this study is carried out has rich vegetation. The participants have an opportunity to see many different plants on the campus where they receive teacher training. But, considering the findings obtained from this study, it is not possible to state that the participants have really seen these plants. On the other hand, the pre-service elementary teachers state that they acquired knowledge about plants via their real-life experiences. It can be stated that the pre-service elementary teachers' awareness of plants developed based on their real-life experiences in their childhood than adulthood. Fancovicova and Prokop (2010) state that early ages are important for individuals' development of ecological awareness. Especially, it is highly likely that the transition ages from abstract to concrete forms of thinking are critical periods to understand and appreciate both animals and plants' roles in habitat.

Conclusion and Suggestions

1. The data and analysis presented in this research revealed that pre-service elementary teachers have an inability to see plants despite their existence around them. It can be stated that the pre-service elementary teachers' plant blindness need to be treated so that they can teach plants effectively to their students.
2. Science education which the pre-service elementary teachers take throughout their lives is not usually their source of knowledge. Because of that, it can be suggested that instruction which will support plant awareness in each level of education from elementary school to university is required. It can be an effective way to compare plants' extraordinary features with students in these instructions.
3. It can be stated that learning about plants may have developed at very young ages and especially with children's real-life experiences. Individuals must be exposed to instruction which will appeal to their different sense organs at very early ages like planting, growing, touching, smelling, and tasting plants and

develop a different perspective towards plants and this can make contribution to promoting awareness of plants.

4. It is really disappointing that families are usually not the source of knowledge for plants. This result can exhibit that schools and teachers have more responsibilities and roles in teaching plants. Parents' participation can be encouraged for plant instruction organized for children in elementary education. Moreover, parents can be encouraged to continue this education in school at home.

Acknowledgement

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Theses Written About Environmental Education:
Turkey – The Czech Republic Comparison

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Abstract

The purpose of this study is to compare the theses written on environmental education in Turkey and in the Czech-Republic. Within the scope of this study, which is conducted by using document analysis, the theses written in Turkey and the Czech-Republic about environmental education in 2007-2013 were compared in terms of year of issue, the type of the sampling and the type of the program in which the thesis is completed. The findings revealed that in 2007-2013, there are totally 130 theses written in Turkey and 49 theses written in the Czech-Republic. While the samplings of the theses written in Turkey mostly consist of pre-service teachers, the samplings of the theses completed in the Czech-Republic are comprised of elementary and high school students. Finally, it was determined that most of the theses in both of the countries were written in the departments affiliated to elementary school education.

Key Words: Environmental education, Turkey, The Czech-Republic, Descriptive statistics

Introduction

Each country wants to be powerful enough to have a say in international issues. This depends on how powerful, effective and up-to-date its education system and policies are. However, it seems to be possible for countries to determine the quality of their education systems by comparing them with the education systems and educational qualifications of other countries. In this respect, comparative studies conducted between two or more countries can bring new, different and more comprehensive viewpoints to educational program development attempts and also contribute to the evaluation of programs (Güzel, Karataş and Çetinkaya, 2010).

Through comparative education studies, information can be obtained about organizational basis and practical applications in the field of education in different countries. Moreover, comparative studies can reveal data about the ways followed by different countries to solve certain problems and thus, such studies can help countries to find solutions to their problems encountered in their education systems (King, 1979). In this connection, research pointed out that though students receive environmental education within the context of science courses in our country, they cannot attain the required environmental literacy level and the desired awareness of sustainability

(Erdoğan, 2009; Soran, Morgil, Yücel and Işık, 2000; Teksöz, Şahin and Ertepınar, 2010; Timur, 2011 Yılmaz, Morgil, Aktuğ and Göbekli, 2002). It is thought that by comparing our environmental education with environmental education of other countries, we can gain some valuable insights that can contribute to the solution of the problem (Tatlı and Adıgüzel, 2012). In this regard, it was decided that the Czech-Republic attaining better results from PISA and TIMMS exams would be suitable to compare with Turkey (EARGED, 2007; EARGED, 2010).

When the relevant literature is examined, it is possible to see studies conducted on different topics of environmental education such as tendencies and directions in master's and doctorate theses written on environmental education completed in 1992-2011 in Turkey (Yılmaz, Aydın and Bahar, 2015); general directions of the theses written about environmental literacy in 1992-2012 (Timur, Yılmaz and Timur, 2014); comparison of environmental policies of countries such as Fiji, Papua New Guinea, India, Oman and Greece with the environmental policy of Turkey (Bakırlı and Artun, 2011); comparison of science teacher education in Macedonia and Turkey (Srbinovski, Erdoğan and Ismaili, 2010); environmental education for pre-school children in different countries (Akçay, 2006); comparison of environmental literacy levels of pre-service teachers in Turkey and the Czech Republic (Kroufek, Çelik and Can, 2015). However, it was found that there is a paucity of studies comparing the theses written about environmental education in our country with those written in other countries. In this respect, the purpose of the current study is to compare the theses written on environmental education in Turkey and in the Czech-Republic in 2007-2013 in terms of their years of issue, sampling type and type of the program where the thesis is issued. For this purpose, answers to the following sub-problems were sought:

What is the distribution of the theses written on environmental education in Turkey and the Czech-Republic in 2007-2013 according to;
   a) years
   b) type of the sampling
   c) type of the program?

Methodology

Research Model

This study was conducted by using document analysis, one of the qualitative research methods. Document analysis is the examination of written and printed materials including information about the topic of research interest (Yıldırım and Şimşek, 2006).

Data Collection Instruments

In the current study, the theses to be analyzed were obtained from the national data bases of the corresponding countries and Proquest data base including theses from many countries. The obtained data are limited to the data available to researchers in both Turkey and the Czech Republic.

Data Collection Process

The information about a total of 185 theses written on environmental education in Turkey and in the Czech-Republic in 2007-2013 was collected by three science education researchers. Of the obtained 185 theses, 6 were discarded from the study as not enough information was reached about them. The remaining 179 theses were classified by using common coding criteria in relation to year of issue, analysis method employed, sampling type and type of the program where the thesis was completed. However, only the criteria of year of issue, type of sampling and type of program were used in the analyses.

Data Analysis

The data collected in the current study about year of issue, sampling type and type of the program variables of the theses completed in 2007-2013 were coded as follows with the agreement of the researchers from the two countries.

- Year of issue: 2007, 2008, 2009, 2010, 2011, 2012, 2013.
- Sampling of the study: pre-school, elementary school, secondary school, high school, few levels of schooling in combination, teachers and others (schools, extra-curricular activity zone, program evaluation, media, news, family, public etc.).
- Type of the program: elementary school teacher education, physics teaching, chemistry teaching, biology department/teaching, educational sciences, instructional technology, geography and geology, ecological sciences, social sciences and interdisciplinary works and administrative sciences.

Findings

In this section, the collected data are interpreted by tabulating them as frequencies and percentages in separate tables.

A. Comparison of the Theses Written in Turkey and the Czech Republic across Years

While comparing the graduate theses written on environmental education in Turkey and the Czech-Republic across years of issue, descriptive statistics were used. The obtained results are presented in Table 1. As can be seen in Table 1, while the number of the theses written about environmental education in Turkey in 2007-2013 is 130, it is 49 in the Czech-Republic.

Table 1.

Distribution of the graduate theses written about environmental education in Turkey and the Czech Republic in 2007-2013 across years

Countries	Years															
	2007		2008		2009		2010		2011		2012		2013		Total	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Turkey	8	6	14	11	11	8	36	28	23	18	24	18	14	11	130	100
Czech Republic	5	10	3	6	8	16	10	21	4	8	8	16	11	23	49	100

As can be seen in Table 1, in all the time periods extending from 2007 to 2013, the number of the graduate theses written in Turkey is greater. On the other hand, in general it is seen that the number of these written on environmental education in Turkey increased from 2007 towards 2010 but this increase was not steady. The number of the theses written in 2010 is higher than the other years. Yet, since 2010, considerable decrease was observed in the number of the theses. In the Czech

Republic, on the other hand, the number of the theses increased between 2010 and 2013. Distribution of the graduate theses written about environmental education in Turkey and the Czech Republic in 2007-2013 across years is shown in Figure 1.
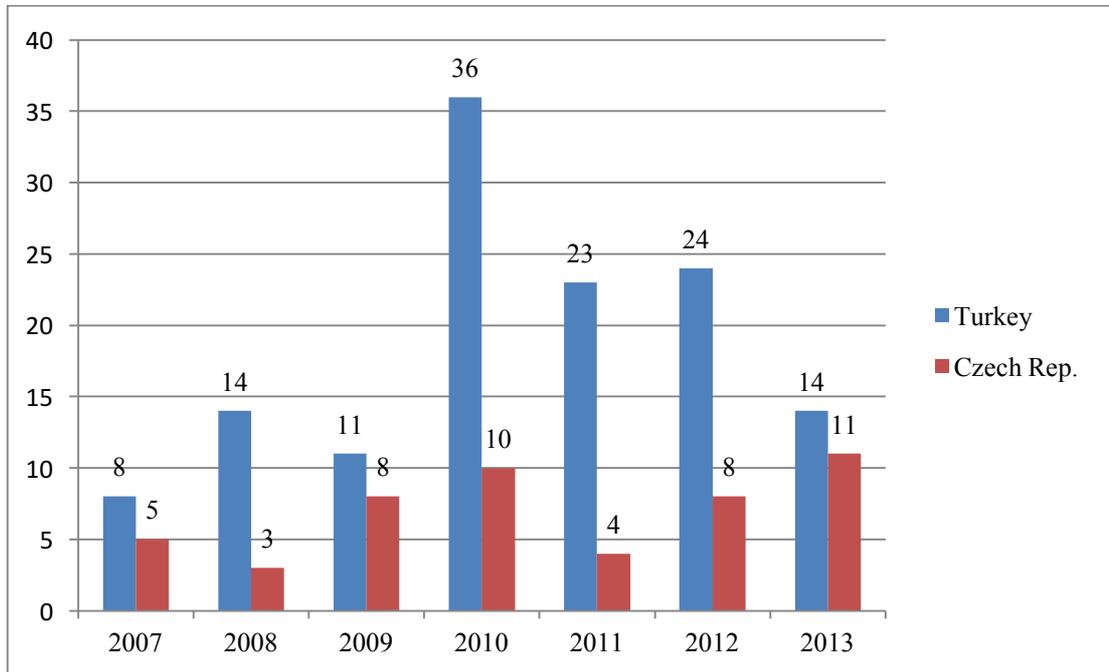

Figure 1.

Distribution of the graduate theses written about environmental education in Turkey and the Czech Republic in 2007-2013 across years

B. Comparison of the Theses Written about Environmental Education in Turkey and the Czech-Republic according to Sampling Type

The data related to the distribution of the graduate theses written about environmental education in Turkey and the Czech Republic according to sampling type are presented in Table 2.

As can be seen in Table 2, the most preferred type of the sampling in the theses written in Turkey is pre-service teachers who will give environmental education (f=34). This is followed by type of the sampling consisting of secondary school students (f=25). Then the sampling types gathered under the heading of "Others" and including media, written and mass media, extra-curricular activities zone, the existing program of the country and comparison with the environmental education program of another country (f=24); elementary school students (f=16); teachers (f=14). The least preferred sampling types are pre-school students (f=4) and mixed levels of schooling.

Table 2.

Distribution of the graduate theses written on environmental education in Turkey and the Czech Republic in 2007-2013 according to type of the sampling

Countries	Sampling Type																	
	Pre-school		Elementary school		Secondary school		High school		Pre-service teachers		Few levels of schooling together		Teachers		Others		Total	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Turkey	4	3	16	12	25	19	9	7	34	26	4	3	14	11	24	19	130	100
Czech Republic	5	10	13	27	8	16	13	27	2	4	7	14	-	0	1	2	49	100

When the sampling types of the theses written in the Czech-Republic are examined, it is seen that the most preferred sampling type is elementary school students (f=13) and high school students (f=13). They are followed by secondary school students (f=8), mixed levels of schooling (f=7), pre-school students (f=5) and pre-service teachers (f=2). Sampling types gathered under the heading of "others" are the least preferred ones (f=1). No study using a sampling consisting of teachers was found in the theses written in the Czech-Republic.

The graphical representation of the distribution of the graduate theses written on environmental education in Turkey and the Czech Republic in 2007-2013 according to sampling types is shown in Figure 2.
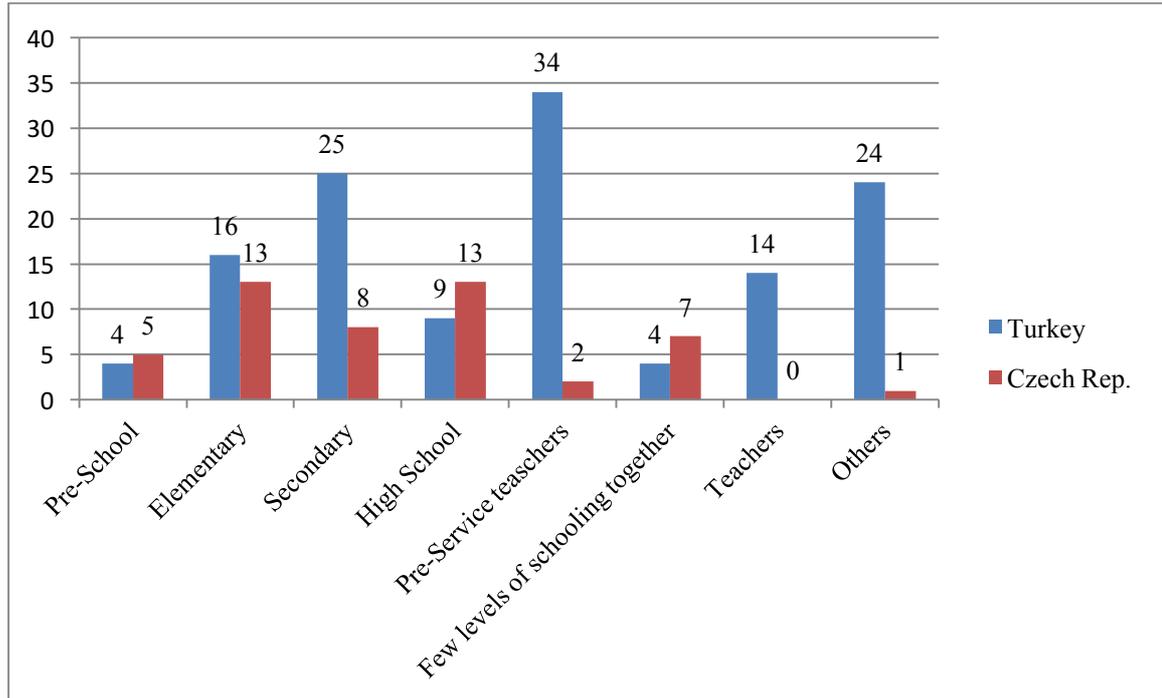
Figure 2.

Distribution of the graduate theses written on environmental education in Turkey and the Czech Republic in 2007-2013 according to sampling types

C. Comparison of the Graduate Theses Written on Environmental Education in Turkey and the Czech Republic according to Program Type

The data related to frequencies and percentages of the types of the programs in which the theses were written on environmental education in Turkey and the Czech Republic are given in Table 3.

As can be seen in Table 3, most of the theses written on environmental education in Turkey were completed in elementary school education programs (f=81) (science teaching, classroom teacher education etc.). From these data, it is clear that the number of the theses completed in elementary school programs is quite higher than the number of theses completed in other programs. Elementary school programs are followed by biology or biology teaching programs (f=19), ecological sciences (f=11); social sciences and interdisciplinary studies (f=7); educational sciences (f=6); geography and geology (f=2). The number of the theses completed in administrative sciences programs (f=2), physics and chemistry teaching (f=1) is highly smaller than the number of theses completed in the other programs. No study on environmental education completed in instructional technologies programs was found.

Table 3.

Frequency and percentage distributions of the theses written on environmental education in Turkey and the Czech Republic according to program types

Country	Program type																		
	Elementary school programs		Physics teaching		Chemistry teaching		Biology/ biology teaching		Educational sciences		Instructional technologies		Ecological sciences		Geography and geology		Social sciences and interdisciplinary		Administrative sciences	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Turkey	81	62	1	1	1	1	19	15	6	5	-	0	11	8	2	1	7	5	2	2
Czech Rep.	24	49	-	0	1	2	3	6	4	8	2	4	8	17	3	6	4	8	-	0

The highest number of the theses written on environmental education in the Czech Republic in 2007-2013 was completed in elementary school programs (f=24). Elementary school programs are followed by ecological sciences program (f=8), educational sciences and social sciences/interdisciplinary (f=4), biology/biology teaching (f=3) and geography and geology (f=3), instructional technologies (f=2). The number of the theses completed in chemistry teaching program is the smallest. No thesis completed in physics teaching and administrative sciences program was found.

The distribution graph of the graduate theses written on environmental education in Turkey and the Czech Republic in 2007-2013 according to program type is presented in Figure 3.
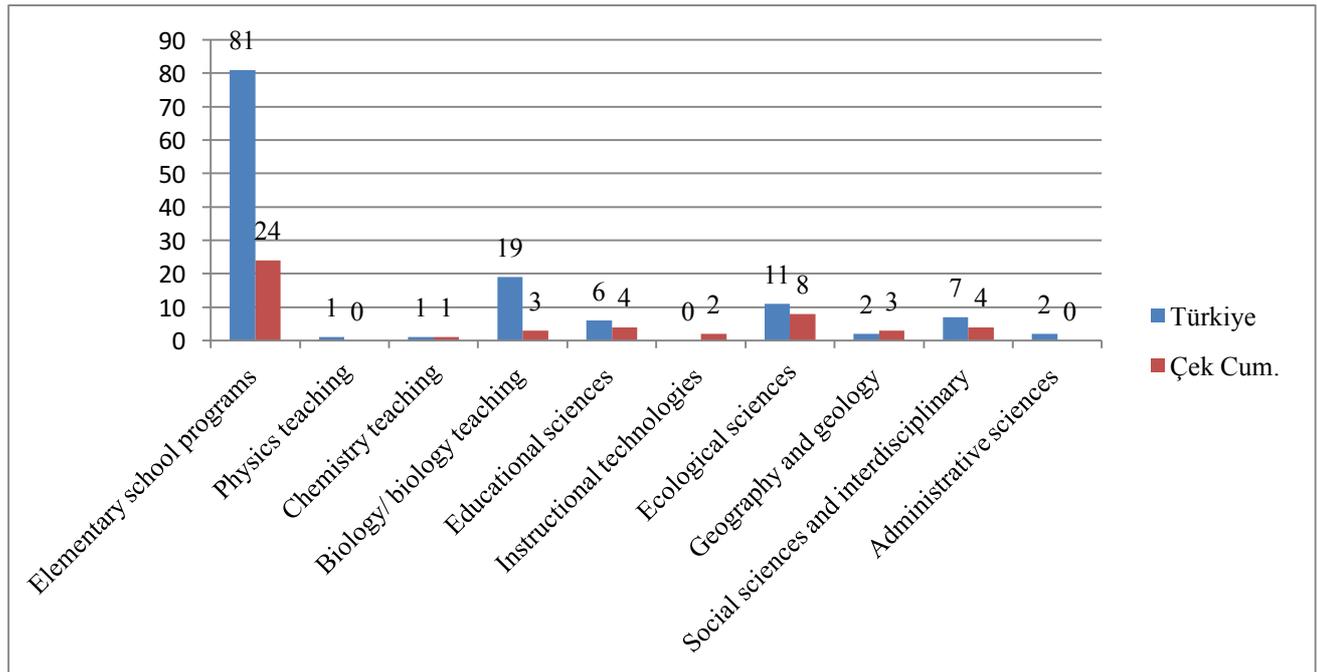
Figure 3.

Distribution of the graduate theses written on environmental education in Turkey and the Czech Republic in 2007-2013 according to program type

Result and Discussion

In the current study, the graduate theses written on environmental education in Turkey and the Czech Republic in 2007-2013 were compared in terms of year of issue, sampling type and program type.

The findings of the study revealed that the number of the graduate theses written on environmental education in Turkey is higher than the number of the theses written in the Czech Republic in 2007-2013. However, considering that the population of Turkey is 76.9 million and that of the Czech Republic is 10.5 million (OECD, 2015a; OECD,2015b), it becomes clear that the number of the theses written in Turkey is relatively smaller. Therefore, it can be argued that the number of the graduate theses written on environmental education in Turkey is small and this number should be increased. This can be done by attaching greater importance to environmental education. On the other hand, the number of the theses written on environmental education increased up to 2010. This is believed to be because from the time when Kyoto Protocol was signed in 2008 up to the time when this protocol was put into force in 2009, issues related to environmental awareness drew greater attention. In the Czech Republic, on the other hand, relatively more theses on environmental education were completed between 2010 and 2013.

In Turkey, the theses written on environmental education mostly prefer pre-service teachers as their samplings. The reason for this preference might be because pre-service teachers are viewed to be very important for environmental education to be given to future generations. Timur, Yılmaz and Timur (2014) conducted a meta-analysis on research focusing on environmental literacy in Turkey and found that the number of the studies performed with the participation of pre-service teachers is higher than that of the other sampling types. In addition to this, students in Turkish education

system are generally exposed to environmental education at secondary education. Thus, in the sampling selection of theses written on environmental education, secondary school students are more preferred. This finding concurs with the finding of the current study. In the current study it was found that the second most preferred sampling type after pre-service teachers is secondary school students. Ünlü, Sever and Akpınar (2011) stated that secondary school students are widely preferred as participants in studies focusing on environmental education. In this regard, this finding is parallel to the finding of the current study. On the other hand, the number of the theses whose samplings consist of pre-school students and participants from few different levels of schooling was found to be the smallest. This leads us to think that greater importance is attached to environmental education at higher levels of schooling.

It was found that most of the theses written on environmental education in the Czech Republic focus on pre-school, elementary and high school students. The number of the theses conducted with these sampling types in Czech Republic is higher than that of the theses written in Turkey. This shows that in the Czech Republic, even at early ages, environmental education is believed to be important. However, the fact that there is no thesis written on teachers is notable.

Both in Turkey and in the Czech Republic, the highest number of theses on environmental education was completed in elementary school education programs because for both of the countries, students' receiving quality environmental education depends on the quality of the education given at elementary school. The number of the theses written on environmental education in biology/biology teaching programs and ecological sciences programs is higher in Turkey and this might be because the content of these programs is closely related to environment and environmental education. In the Czech Republic, on the other hand, the highest number of theses written on environmental education was completed in ecological sciences program. Yet, it is not correct to restrict environmental education to a single discipline. Therefore, increase in the number of studies conducted within the context of different disciplines in Turkey may help individuals to understand the environment from different perspectives. For example, Palmberg and Kuru (2000) stated that activities such as field trips, nature walks or camping increase students' interactions with nature, encourage them to be more sensitive towards nature and thus their social relationships can develop. This finding concurs with the findings of the current study.

Conclusions and Suggestions

In light of the findings of the current study, following conclusions were reached:

- In 2007-2013, 130 graduate theses were written on environmental education in Turkey and 49 theses in the Czech Republic.
- The highest number of theses on environmental education was completed in Turkey in 2010 and in the Czech Republic between 2010 and 2013.
- As the sampling type in the theses written in Turkey, the most preferred group is pre-service teachers and in the Czech Republic, it is elementary and high school students.
- The highest number of theses written on environmental education in Turkey and in the Czech Republic was completed in elementary school education programs.

In light of these findings, following suggestions can be made:

- Proportionally, the number of the theses written on environmental education in Turkey is lower than the number of the theses written in the Czech Republic. Therefore, more research should be conducted on environmental education in Turkey to raise people's awareness of increasing environmental problems and to inculcate scientific perspectives in people.
- Future research might involve different sampling types.
- As environmental education encompasses many disciplines, researchers from the fields of media, field trips and camping etc. should conduct research on environmental education so that more comprehensive perception of environmental awareness can be promoted.
- As the number of studies on pre-school children is small, more studies should be conducted on this sampling type so that environmental education can be given at early ages.

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Environmental Ethics Awareness of Teachers

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Abstract

The purpose of the present research is to determine science teachers' and biology teachers' awareness levels of environmental ethics in relation to different variables. The "Environmental Ethics Awareness Scale" developed by Özer and Keles (2016) was used in the research. The research is consisted of 237 people, including 130 science teachers and 107 biology teachers working in different school of Turkey. Independent t test, one way analysis of variance (anova), Kruskal-Wallis analysis and Tukey significance test were used to determine the statistical significance of the obtained data in the research using relational screening model. According to research findings; it is understood that education level, graduation achievement, on the tenure of office and the having environment lesson does not make a meaningful difference for science teachers and biology teachers. However, gender and the institution that worked were significant differences (p<.05) in the environmental awareness of science teachers.
Keywords: Environmental ethics, environmental ethics awareness, science teacher, biology teacher

Introduction

The environment can be described as 'the environment in which the living things live, are connected by vital bonds and interact with each other in various forms' (Yıldız & et al., 2005: 14). There is a balance between the living and non-living factors that make up the environment. However, Scientists have pointed out that human-induced activities after the Industrial Revolution led to the destruction of the balance in the periphery (Legget, 2007: 19). People's thoughts and behaviors are also influential in the formation of environmental problems (Watson & Halse, 2005; Kahyaoğlu, 2011; Şenyurt, Temel & Özkahraman, 2011). Mankind has adopted the concept of excessive consumption and destruction, as opposed to benefiting from nature at the rate of its own needs. Moreover, mankind regarded itself as the "master of nature"(Armstrong & Botzler, 1993: 53) and thought that other beings had no value other than their utility (Karaca, 2007). This has resulted in serious degradation of natural balance and serious environmental problems. People are now faced with environmental problems that have previously been ignored (Ertan, 2004). Human nature needs to learn that it is part of nature, not ownership. This will ensure that the person is aware of their responsibilities towards nature. Human is not the owner of nature. He has to learn that human beings are part of nature. This will ensure that the person is aware of their responsibilities towards natüre (Özer & Keleş, 2016). It is very important that the individual is aware of the environment ethics. Individuals who are aware of environmental ethics are actively involved in the protection of the environment. Environmental ethics is concerned with the resolution of environmental problems faced by individuals (Freiman, 2006). Environmental ethics is a theoretical discipline that examines all kinds of attitudes and behaviors that people consider important when making decisions about nature, factors that make up nature, or the environment (Karaca, 2007). The environmental ethic evaluates the relationship of people to nature

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in a moral framework (Özer & Keleş, 2016) and tries to find the right behavior towards the environment. Environmental ethics allows the individual to appreciate the value of nature (Mahmutoğlu, 2009). It is emphasized that environmental ethics is the responsibility of the environment in which the person lived, and that every living thing should behave in a way that considers the vital rights it possesses (Özer & Keleş, 2016).

Environmental ethical approaches are examined in three categories (Gagnon Thompson & Barton, 1994; Kayaer, 2013; Gerçek, 2016). The humanistic approach sees man as the proprietor of natüre (Özer & Keleş, 2016) and values the living and non-human beings outside human beings according to the benefits he provides to man (Gerçek, 2016). The livelihood-based approach considers human beings and other living beings as a whole, evaluating the environment as benefit to these beings.

Living and non-living goods are semmed as a whole by environmental-centered approach. Also, ethical approaches of humans about environment are distant from human centered approach to living environment centered approach (Kayaer, 2013). Basic principles of environmental problems are human behavious, as results of this awareness of humans about environment become an important issue (Erten, 2004). Protecting of environment is not only today's problem but also it is important for future. Therefore, by getting environment education, human's perception, attitude, aweraness and consciousness become more effective. According to the literatüre search, there are many different studies about environmental ethics (Holden, 2003; Preston, 2005; Psarikidou, 2008; Laal, 2009; Mahmutoğlu, 2010; Gražulevičiūtė-Vileniškė & Narvydas, 2012). Approaches about environmental ethics, (Karaca, 2007; Kayaer, 2013; Ağbuğa, 2016), consciousness (Kılıç & İnal, 2010; Talas & Karataş, 2012), aweraness (Çabuk & Karacaoğlu, 2003; Şenyurt, Bayık Temel & Özkahraman, 2011; Dolmacı ve Bulgan, 2013), perception (Bülbül, 2013; Gerçek, 2016; Tesfai, Nagothu, Šimek & Fučík, 2016) approach (Saka, Sürmeli ve Öztuna, 2009; Özdemir, 2012) studies are found.

Approaches about environmental ethics, (Karaca, 2007; Kayaer, 2013; Ağbuğa, 2016), consciousness (Kılıç & İnal, 2010; Talas & Karataş, 2012), aweraness (Çabuk & Karacaoğlu, 2003; Şenyurt, Bayık Temel & Özkahraman, 2011; Dolmacı ve Bulgan, 2013), perception (Bülbül, 2013; Gerçek, 2016; Tesfai, Nagothu, Šimek & Fučík, 2016) and approach (Saka, Sürmeli ve Öztuna, 2009; Özdemir, 2012) studies are found.

According to literature search it was seen that there were not enough studies about awareness of ethical approaches about environment. Keleş ve Özer studied about awaereness of environmental ethics of educational science teacher's candidates. Moreover, Nagra (2010) studied about ethical aweraness of teachers on environment about different varities.

In the program of Educational Science in Turkey, it is defined that persons who are literacy of science, understand all the interactions between science, humanity, technology and environment, and also have an idea about scientific approaches (MEB, 2013). Teachers have great responsibilities on science literacy persons' aweareness, approaches and behaviours about environment. For protecting quality of environment and life on both future and now, some basic aims for solutions have to be produced (Keleş, 2007). Informations of teachers about environment, is important for solving problems (Mosothwane, 1991).

Teachers have to remember to their students about responsibilities on environment and they have to get awareness (Özer & Keleş, 2016). In order to make this kind of consciousness, teachers have to become their aweareness much more than students (Keleş, Uzun & Varnacı Uzun, 2010).

It is identified that there is no more studies about environmental ethical awareness on educational science and biology teachers. Therefore this study will be contrubuted to literatüre on this area.

Purpose of research

The purpose of the present research is to determine science teachers' and biology teachers' awareness levels of environmental ethics in relation to different variables. On the frame of this aim, answers are searched for below questions:

1. Do science teachers' and biology teachers' differ environmental ethics awareness in terms of gender?

2. Do science teachers' and biology teachers' differ environmental ethics awareness in terms of working institutions?

3. Do science teachers' and biology teachers' differ environmental ethics awareness in terms of education level?

4. Do science teachers' and biology teachers' differ environmental ethics awareness in terms of the having environment lesson?

5. Do science teachers' and biology teachers' differ environmental ethics awareness in terms of the graduation achievement score?

6. Do science teachers' and biology teachers' differ environmental ethics awareness in terms of the the tenure of office?

Methodology

Research model

In this research, the relational screening model was used. The relational screening model is a general screening model used in research to determine the changes in two or more variables and the degree of change (Karasar, 2006, 81).

Data Collection Tool

In this research, "Environmental Ethics Awareness Scale" developed by Özer and Keles (2016) was used. The scale was prepared with a 5-point Likert type scale consisting of 23 questions with 4 factors. Questions on the scale are evaluated by numbering 1 = absolutely disagree, 2 = disagree, 3 = unstable, 4 = agree, 5 = strongly agree. The reliability of your scale by Özer and Keles (2016) was found as cronbach alpha factor of .95. The reliability of this research scale was found to be cronbach alpha number of .92 for science teachers and .96 for biology teachers.

Data Analysis

Data gathered through the frame of the research is analyzed with IBM SPSS-21 statistical program. For the evaluation, we used an independent t-test, variance analysis (anova), Kruskal-Wallis analysis and Tukey test. On the other hand, data is valued with 0.05 meaningfulness level and their percentage, frequency, average and standard deviation values are given.

Research group

The research is consisted of 237 people, including 130 science teachers and 107 biology teachers working in different school of Turkey. When T.C. the Ministry of National Education's curricula are examined, it is observed that the subjects related to

the environment are included in the Science Curriculum and the Biology Course Curriculum. So research was carried out by teachers of science and biology. The research was conducted during the academic years 2016-2017. The distribution of the demographic information of science and biology teachers participating in the research is given in Table 1.

Table 1.

Demographic information of science teachers and biology teachers

		Science teachers		Biology teachers	
		N	%	N	%
Gender	Female	81	62.3	65	60.7
	Male	49	37.7	42	39.3
Working institution	Public school	81	62.3	64	59.8
	Private school	49	37.7	43	40.2
On the tenure of office	0-5 years	89	68.5	62	57.9
	6-10 years	26	20.0	24	22.4
	>10 years	15	11.5	21	19.6
Education level	University	92	70.8	40	37.4
	Master	38	29.2	67	62.6
Graduation achievement score	0.0-2.49	4	3.1	5	4.7
	2.50-2.99	67	51.5	35	32.7
	3.00-3.49	42	32.3	38	35.5
	3.50-4.00	17	13.1	29	27.1
The having environment lesson	Yes	115	88.5	89	83.2
	No	15	11.5	18	16.8
		130	54.9	107	45.1

Findings

In the research, an answer to question *"Do science teachers' and biology teachers' differ environmental ethics awareness in terms of gender?"* was searched the independent t-test results obtained are given in Table 2.

Table 2.

The results of t-test for gender variable

Branch	Gender	N	$\overline{X}$	sd	t	p
Science teachers	Female	81	4.60	128	2.466	.015*
	Male	49	4.40			
Biology teachers	Female	65	4.46	105	0.56	.576
	Male	42	4.38			

*p<.05

When the data in Table 2 were examined, it was founded that the scores of science teachers are (t(128) =2.466; p<.05) and biology teachers are (t(105) =0.56; p>.05). A difference was found between the male and the female participants of the science teachers in favor of the female teachers (4.60) and this difference is statistically significant. According to these results, it can be said that gender is an effective variable in environmental ethics awareness science teachers. However, it turned out to be not a difference related with gender for biology teachers. It can be said that gender is not an effective variable in environmental ethics awareness of biology teachers.

In the research, an answer to question "*Do science teachers' and biology teachers' differ environmental ethics awareness in terms of working institutions?*" was searched. The independent t-test results obtained are given in Table 3.

Table 3.

The results of t-test for working institution variable

Branch	*Institution*	*N*	$\overline{X}$	*sd*	*t*	*p*
Science teachers	Puclic school	81	4.60	128	2.375	.019*
	Private school	49	4.40			
Biology teachers	Puclic school	64	4.46	105	0.533	.595
	Private school	43	4.39			

*p<.05

When the data in Table 3 were examined, it was founded that the scores of science teachers are (t(128) =2.375; p<.05) and biology teachers are (t(105) =0.533; p>.05). A difference was found between the public school and the private school participants of the science teachers in favor of the public school teachers (4.60) and this difference is statistically significant. According to these results, it can be said that working institution is an effective variable in environmental ethics awareness science teachers. However, it turned out to be not a difference related with for working institution biology teachers. So, it can be said that working institution is not an effective variable in environmental ethics awareness of biology teachers.

In the research, an answer to question *"Do science teachers' and biology teachers' differ environmental ethics awareness in terms of education level?"* was searched. The independent t-test results obtained are given in Table 4.

Table 4.

The results of t-test for education level variable

Branch	*Education level*	*N*	$\overline{X}$	*sd*	*t*	*p*
Science teachers	University	92	4.49	128	-1.608	.110
	Master	38	4.63			
Biology teachers	University	40	4.28	105	-1.726	.087
	Master	67	4.52			

*p<.05

When the data in Table 4 were examined, it was founded that the scores of science teachers are (t(128) =-1.608; p>.05) and biology teachers are (t(105) =-1.726; p>.05). According to this result, it can be said that education level does not have the effect on environmental ethics awareness of science teachers and biology teachers. When the averages are analyzed, it can be seen that education level creates a positive effect on environmental ethics awareness of science teachers, but a negative effect to environmental ethics awareness of biologly teachers.

In the research, an answer to question "Do science teachers' and biology teachers' differ environmental ethics awareness in terms of the having environment lesson was searched. The independent t-test results obtained are given in Table 5.

Tablo 5.

T-test analysis results according to the having environment lesson

Branch	The having environment lesson	N	$\overline{X}$	sd	t	p
Science teachers	Yes	115	4.52	128	-.142	.887
	No	15	4.54			
Biology teachers	Yes	89	4.46	105	.285	.285
	No	18	4.27			

*p<.05

When the data in Table 5 were examined, it was founded that the scores of science teachers are (t(128) =-0.142; p>.05) and biology teachers are (t(105) =.285; p>.05). According to this result, it can be said that having environment lesson does not have the effect on environmental ethics awareness of science teachers and biology teachers. When the averages are analyzed, it can be seen that having environment lesson creates a negative effect to environmental ethics awareness of science teachers, but a positive effect to environmental ethics awareness of biologly teachers.

In the research, an answer to question *"Do science teachers' and biology teachers' differ environmental ethics awareness in terms of the graduation achievement score?"* was searched. The obtained one-way analysis of variance (anova) results are given in Table 6 and Table 7.

Tablo 6.

Frequency, mean and standard deviation for graduation achievement score

	Science teachers			Biology teachers		
Graduation achievement	N	$\overline{X}$	ss	N	$\overline{X}$	ss
Other	4	4.55	.24	5	4.43	.22
2.50-2.99	67	4.52	.36	35	4.52	.62
3.00-3.49	42	4.48	.64	38	4.30	.83
3.50-4.00	17	4.66	.28	29	4.49	.54
	130	4.53	.46	107	4.53	.67

Tablo 7.

The results of one-way ANOVA test for graduation achievement score

		Squares All	sd	Squares Average	F	p
Science teachers	Between Groups	.374	3	.125	.576	.632
	In-Group	27.273	126	.216		
	All	27.647	129			
Biology teachers	Between Groups	1.062	3	.354	.767	.515
	In-Group	47.512	103	.461		
	All	48.575	106			

*p<.05

When the data in Table 6 and Table 7 were examined, it was founded that the scores of science teachers are [F(3,126)=.576;p>.05] and biology teachers are [F(3,103)=.576;p>.05]. According to this result, it can be said that graduation achievement score does not have the effect on environmental ethics awareness of science teachers and biology teachers.

In the research, an answer to question *"Do science teachers' and biology teachers' differ environmental ethics awareness in terms of* the tenure of office?" was searched. The obtained one-way analysis of variance (anova) results are given in Table 8, Table 9. The obtained analysis of Kruskal Wallis results are given in Tablo 10. The Kruskal-Wallis test, a nonparametric test, was performed because the homogeneous distribution of the data obtained in terms of the tenure of office was not achieved for science teachers'

Table 8.

Frequency, mean and standard deviation for the tenure of office

Biology Teachers			
The tenure of office	*N*	$\overline{x}$	*ss*
0-5 years	62	4.48	.55
6-10 yeas	24	4.37	.81
>10 years	21	4.34	.84
	107	4.43	.67

Table 9.

The results of one-way ANOVA test for the tenure of office

		Squares All	**sd**	**Squares Average**	**F**	**p**
Biology Teachers	Between Groups	.425	2	.212		
	In-Group	48.150	104	.463	.459	.633
	All	48.575	106			

*p<.05

When the data in Table 8 and Table 9 were examined, it was founded that the scores of biology teachers are [F(2,104)=.459; p>.05]. According to this result, it can be said that the tenure of office does not have the effect on environmental ethics awareness of biology teachers.

Table 10.

The results of Kruskal-Wallis H test for the tenure

Science teachers					
The tenure of office	*N*	*Line Avr.*	*sd*	X^2	*p*
0-5 years	89	66.39			
6-10 yeas	26	67.40	2	.901	.637
>10 years	15	56.90			

*p<.05

When the data in Table 8 and Table 9 were examined, it was founded that the scores of science teachers are (X^2=.901; p>.05). According to this result, it can be said that the tenure of office does not have the effect on environmental ethics awareness of science teachers.

Results and Discusiion

In this research, it was aimed to determine the environmental awareness of science teachers and biology teachers. According to this aim, the effect of variables such as "gender, institution, level of education, the having environment lesson, graduation achievement score, the tenure of office " are examined.

There was statistically significant difference environmental awareness of science teachers in terms of gender. Environmental awareness of female science teachers are higher than male science teachers. So, it can be said that gender is an effective variable in environmental ethics awareness science teachers. There was not statistically significant difference environmental awareness of biology teachers in terms of gender. It can be said that gender is not an effective variable in environmental ethics awareness of biology teachers. However, when the averages were examined (Table 2), environmental awareness of female biology teachers are higher than male biology teachers. Many studies on this subject have produced results. For instance, in the study of Keles and Özer (2016), it stated that environmental ethics awareness level of female was higher than male pre-service teachers. Tesfaye et al. (2016), they stated that the perceptions of secondary school students about environmental services differ in favor of female students. According to a report by Pherigo (1997), female have higher environmental concerns than men. Wongchantra, Boujai, Sata, & Neungchalem (2008) stated that the environmental education-training process females' were more effective and environmental ethics were higher. These results support the findings of the research. However, contrary to the findings of the research in the literature, Özdemir (2012) stated that there is no difference in the ethical attitudes towards the periphery of senior students in terms of gender. Nagra (2010) stated that secondary school and primary school teachers' awareness of environmental ethics did not differ in terms of gender. Turan (2009) stated that there is no significant difference between ethnic approaches of the secondary school students regarding the environment in terms of gender.

There was statistically significant difference environmental awareness of science teachers in terms of working institution. A difference was found between the public school and the private school participants of the science teachers in favor of the public school teachers. There was not statistically significant difference environmental awareness of biology teachers in terms of working institution. It can be said that working institution is not an effective variable in environmental ethics awareness of biology teachers. However, when the averages were examined (Table 3), it has been seen that environmental ethics awareness in public biology teachers have higher than private biology teachers.

There was not statistically significant difference environmental awareness of teachers who are science teachers and biology teachers, in terms of education level. It can be said that education level is not an effective variable in environmental ethics awareness of teachers. However, when the averages were examined (Table 4), it stated that the increase in the level of education in science and biology teachers leads to an increase in the environmental ethics awareness of level. As the level of education increases, environmental ethic perception is expected to increase (Tikka, Kuitunen and Tynys, 2000; Wilkinson, 2002). Gerçek (2016) stated that the perception of environmental ethics of university students was not significantly different from the level of education. Tesfai et al. (2016) stated that there was no significant difference in perception of environmental ethics of secondary students compared to the level of education. This result overlaps with the findings of the research.

There was not statistically significant difference environmental awareness of science teachers and biology teachers, in terms of having environment lesson. It can be said

that having environment lesson is not an effective variable in environmental ethics awareness of science teachers and biology teachers. However, when the averages were examined (Table 5), it stated that having environment lesson creates a negative effect to environmental ethics awareness of science teachers, but a positive effect to environmental ethics awareness of biologly teachers. In the study of Keles and Özer (2016), it was stated that the environmental ethics awareness levels of prospective teachers who take environment courses in undergraduate education were increased. This result overlaps with the findings of the research. It has been determined that environmental education does not have a positive effect on the awareness level of environmental ethics for science teachers. It can be said that this result is caused by the inadequacy of the environmental lesson which plays an active role in the formation of environmental ethics in the individuals (Çabuk and Karacaoğlu, 2003; Demir and Yalçın, 2014). This finding in the research has shown that environmental education should be examined in terms of its quality.

There was not statistically significant difference environmental awareness of science teachers and biology teachers, in terms of graduation achievement score. It can be said that graduation achievement score is not an effective variable in environmental ethics awareness of science teachers and biology teachers. However, when the averages were examined (Table 6), it determined that as the graduation achievement score increased, environmental ethics awareness of teachers increased. Probable, teachers with high grades are more interested in the environmental course. For this reason, there are differences in the levels of ethical awareness towards the environment. Atlı, Uzun, Saraç, Sağlam and Sağlam (2014) stated that there is a positive relationship between students' academic achievement score and ethical approach scores towards the environment. This supports the findings of the research.

There was not statistically significant difference environmental awareness of science teachers and biology teachers, in terms of the tenure of office. It can be said that the tenure of office is not an effective variable in environmental ethics awareness of science teachers and biology teachers. However, when the averages were examined (Table 8 and 10), it determined that as the the tenure of office decreased, environmental ethics awareness of teachers increased. This is thought to be due to the fact that the information of the newly graduated teachers is current. Bülbül (2013) stated that raising the grade level in teacher candidates in his study caused a decrease in environmental awareness. Keles and Özer (2016) stated that knowledge of the environment course influenced the environmental ethical awareness of teacher candidates. These results are consistent with the findings of the investigation.

According to the findings of this research, it is thought that similar studies should be done with reference to different samples and variables. Thus, it is possible to generalize the variables affecting awareness of environmental ethics. In addition, studies should be carried out to show the importance of the environmental course that teacher candidates take during undergraduate education.

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Self-Efficacy Beliefs on Integrating Sustainability into Profession and Daily Life: in the Words of University Students

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Abstract

Integrating sustainable development into higher education is essential to reach a sustainable future; accompanied with level of knowledge, increasing level of motivation of university students is also crucial since motivation affects their ways of sustainable behaviour. Therefore, this study aimed to explore university students' reflections about their level of knowledge on sustainability and their ways of integrating sustainability principles into their profession and daily life. Thus, we attempted to investigate university students' level of self-efficacy beliefs on integrating sustainability into their profession and daily life after completing a sustainability course. However, since there is no specific instrument to evaluate university students' self-efficacy beliefs on this subject, we adapted the instrument (originally developed by Enochs & Riggs, 1990) to determine university students' self-efficacy beliefs on integrating sustainability into profession and daily life and used the instrument to explore our research questions. Besides, we used students' essays and self-reports in order to evaluate their conceptions on sustainability. The implementation was realised with 113 university students studying at a state university in Ankara, Turkey). According to the exploratory factor analysis results, two dimensions emerged as Daily Life Efficacy and Profession Efficacy to integrate sustainability. The results showed that university students who attended the sustainability course have relatively high personal self-efficacy beliefs towards integrating sustainability into their daily life. Nevertheless, although they reported that they have enough background knowledge on sustainability and have high self-efficacy, evaluations of the students' essays on the definition of sustainability showed that they do not hold a holistic understanding.

Keywords: Self-Efficacy, Sustainable Development, Higher Education, Mixed-Method.

Introduction

The development of the notion of sustainable development is a dynamic phenomenon (Egelston, 2006), and its description has been evolving over time. Although there are different approaches and definitions for sustainable development, the commonly used one is the definition declared in Brundtland Commission Report, Our Common Future (1987), "…development that meets the need of the present without compromising the ability of future generations to meet their own needs" (p.43). In order to elucidate the key elements of sustainable development, 18 principles were declared in the United Nations Conference on Environment and Development (UNCED), also known as Rio Declaration (UNCED, 1992). These principles explicated the components of sustainability as environmental, social and economic. However, the debate and

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interpretations about sustainable development continue expanding; in 2010, for example, UNESCO (2010) defined sustainable development through four dimensions which are environment, economy, society, and policy.

The perception of Education for Sustainable Development (ESD), on the other hand, has been integrated into sustainability agenda targeting to endorse education and public awareness since Stockholm Conference (1972) and through Agenda 21 (1992). It was emphasized that education is an indispensable tool to permit individuals to deal with the challenges of present and future generations and offer plausible solutions. Correspondingly, UNESCO defined four objectives of ESD as (UNESCO, 2005, p.7) "(1) improving access and retention in quality basic education; (2) reorienting existing educational programmes to address sustainability; (3) increasing public understanding and awareness of sustainability; and (4) providing training to all sectors of the workforce."

The idea of integrating sustainable development into higher education emerged with the Talloires Declaration of University Leaders for a Sustainable Future (1990), the official agreement of university administrators to infuse ESD in higher education. This integration mainly stemmed from the fact that universities have the capacity to raise future leaders so that they can engage in science, technology, economy and community, thus playing a critical role for a sustainable future (Moore, 2005b; Tuncer, 2008). Correspondingly, universities have been considered as one of the key contributors to the sustainable development (Haigh, 2005). In line with these, more than 400 colleges from 40 countries reached an agreement about the integration of sustainable development into university campus life as well as education systems (Cotton, Warren, Maiboroda & Bailey, 2007) so as to raise awareness about impacts of daily life activities on environmental degradation, economy and human life (Moore, 2005a).

As McKeown (2002) denoted, contributions of current disciplines, education programs and teachers are significant in order to proceed in incorporating sustainable development into education system. Moreover, increasing level of motivation of university students should also come into prominence since motivation affects the way individuals act and their attainment of goals (Pintrich & Schunk, 2002). Motivation refers to all courses of actions that are encouraged and maintained throughout the process (Pintrich & Schunk, 2002). Hence, one of the primary points of this research is that the context of an ESD course in higher education should be constructed concerning the relationships among learning, attainment and motivation, depending on the fact that learning and attainment are to motivation (Bandura, 1977).

Social cognitive theory is one of the motivational science theories with the focal point of obtaining information, skills, beliefs, and strategies of individuals by means of interrelationships (Pintrich & Schunk, 2002). Self-efficacy beliefs, on the other hand, are one of the key elements in this theory which influence individuals' attainment of courses of action, performance and their endurance during the process (Bandura, 1977). Self-efficacy beliefs were described by Bandura (1977) as "the beliefs in one's capabilities to organize and execute the courses of action required producing given attainments" (p.3). These beliefs affect the selection of activities, the individual efforts, the level of persistence for impediments, the endurance and the level of achievement (Bandura, 1977). According to Bandura, high self-efficacious individuals tend to form more challenging goals, overcome difficulties and have higher level of motivation (Locke & Latham, 1990). On the other hand, low self-efficacious individuals may avoid executing the courses of action (Pintrich & Schunk, 2002). Moreover, higher self-efficacy beliefs help individuals encountering difficulties and determine how to overcome challenges (Bandura, 1977; Pajares, 1992). In line with this point of view, we hypothesize that individuals with high self-efficacy can challenge the difficulties during

the process of meeting sustainable development goals compared to low self-efficacious individuals. Furthermore, ESD provides excellent opportunities for the learners through which they can improve their knowledge, values and necessary skills to integrate sustainability concept into their daily lives and profession. Therefore, we believe that ESD programs in higher education are essential to develop self-efficacy to incorporate sustainability both into profession and daily life.

Self-efficacy literature, in general terms, supplies data related to individuals' motivation, academic achievement, approach and possible behaviours towards an issue (Tschannen- Moran & Woolfolk Hoy, 2007). In short, a review of broad and complex literature on self-efficacy indicated that the emerging issues were focused on K-12 students' and in-service teachers' self-efficacy beliefs (Allinder, 1994; Sungur & Gungoren, 2009; Sungur & Kahraman, 2011; Tschannen- Moran & Woolfolk Hoy, 2007) as well as pre-service teachers' from different disciplines self-efficacy beliefs (Aydin & Boz, 2010; Azar, 2010; Bahcivan, & Kapucu, 2014; Demirtas, Comert & Ozer, 2011; Gencer & Cakiroglu, 2007; Onder & Kocaeren, 2015; Trauth-Nare, 2015). Although there have been a lot of research studies on self-efficacy beliefs, there has been limited research conducted on self-efficacy beliefs and sustainable development targeting students in higher education (e.g. Effeney & Davis, 2013; Heeren et. al, 2016; Louisa, Sarah & Cliff, 2017; McCormick, Bielefeldt, Swan, & Peterson, 2015; Moseley, Reinke & Bookout, 2002;). For instance, McCormick et al. (2015) conducted a study to asses engineering students' self-efficacy beliefs, affect, and values toward sustainable engineering. A total of 515 engineering students from three universities participated into the study. The results indicated that participating in experiential learning activities had a positive relationship with students' self-efficacy beliefs, values and affect for sustainable engineering. Moreover, female students have higher affect and value towards sustainable engineering. Hence, the researchers recommended that specific courses fostering active learning may influence students' motivation toward sustainable engineering.

Nevertheless, there are studies about the perceptions, attitudes, and behaviours of the university students about sustainable development (Emanuel & Adams, 2011; Heeren et. al, 2016; Horhota, Asman, Stratton, & Halfacre; 2014; McCormick et al., 2015; Parrott, Mitchell, Emmel & Beamish, 2011; Sahin, Ertepinar & Teksoz, 2009; Tuncer, 2008). For instance, Tuncer (2008) examined university students' conceptions about sustainable development and their intensions of shifting life styles in a sustainable way. In this study, most of the university students admitted taking action to change their life styles, not to exploit natural resources and to save them for the future generations. Nevertheless, the author emphasized that the participants' conceptions should be improved by ESD courses in higher education in such a way that they promote integrating sustainability principles into their daily lives. Similarly, Sahin, Ertepinar and Teksoz (2009) aimed to explore university students' conceptions of 'sustainable development' and to determine their attitudes towards sustainable development, environmental values and their behaviours about sustainable life style. The responses of the students revealed that even though they were acquainted with the concept of sustainable development, they lacked a holistic conception of sustainability. Moreover, the researchers reported that university students had positive attitudes and intrinsic values towards sustainable development, but they did not engage in a sustainable life style. On the other hand, Parrott, Mitchell, Emmel and Beamish (2011) investigated the outcomes of a course in the US, the content of which fosters resource protection and increasing environmental quality. In this study, most of the students emphasized that more efforts (in terms of training and education) are needed to increase the motivation to achieve environmental sustainability. In another study, Emanuel and Adams (2011) compared the responses of college students in Alabama and Hawaii in terms of their level of concern about the present and the future,

their level of knowledge of sustainability and their level of perception about people who are responsible for sustainability. The researchers reported that students had enough background knowledge about campus sustainability; however, their level of commitment is not sufficient when compared to the level of their knowledge. As a result, the authors suggested investigating possible ways to promote student commitment.

Thus, we may infer in the light of literature review that ESD play a critical role in conceiving the idea of sustainability. Nevertheless, it is also obvious that high level of knowledge and positive attitudes are not enough to convince individuals to integrate sustainability principles into their profession and daily life. Therefore, we claim that further studies are needed to explore the interrelationship between university students' motivational state and behaviour in the context of integrating sustainability into their lives. Thus, as there is limited research in the context of self-efficacy beliefs and as the current literature does not provide an instrument to assess individuals' self-efficacy beliefs in terms of integrating sustainability into their daily life and/or professional life; we aimed with the present study to develop an instrument to do so. Through the instrument, we attempted to explore university students' level of self-efficacy beliefs on integrating sustainability (SEBIS) into their profession and daily lives. We believe that developing such an instrument which promises valid and reliable data may encourage researchers to produce further research so as to enrich self-efficacy literature in terms of sustainability context in higher education. Moreover, the results of the current study may inspire researchers concerning the effect of sustainability courses on developing self-efficacy beliefs of university students on sustainability. Besides, offering SEBIS instrument may be meaningful especially for the developing countries, like Turkey, where there are several attempts to integrate sustainability into higher education so as to bring up future leaders with higher self-efficacy to integrate sustainability into their professional and daily lives and reorient programs accordingly. Last, but not least, since organizing and executing the courses of action is one of the key elements of self-efficacy (Bandura, 1977), determining university students' self-efficacy on sustainability integration and focusing on increasing their efficacy beliefs may help them live sustainably and integrate this context into their daily life and profession. Based on the above mentioned significances, the research questions of this study are as:

a) Is Self-Efficacy Beliefs on Integrating Sustainability (SEBIS) Scale a valid and reliable tool to assess university student's self-efficacy beliefs on integrating sustainability into their profession and daily life?
b) What is sustainability in the words of university students?
c) What are the university students' self-efficacy levels regarding integrating sustainability concept into their profession?
d) What are the university students' self-efficacy levels regarding integrating sustainability concept into their daily life?

Methodology

Research Design

A mixed method-explanatory design was used to analyse data. Self-efficacy beliefs instrument which was previously developed by Enochs and Riggs (1990) and translated by Tekkaya, Cakiroglu and Ozkan (2004) was adopted by the researchers. A total of 113 university students' levels of self-efficacy were explored quantitatively via descriptive statistics. On the other hand, students' understandings of sustainability and their ways of integrating the concept into daily and professional lives were explored qualitatively through essay writing. The topic given to the students for the essay was "What is your definition of sustainability?" Of the participants, 30 of them were

randomly selected to examine their understanding of sustainability via content analysis.

Procedure

Turkey, as a developing country, has been trying to start some initiatives about policies on sustainable development in line with the global mainstream. Although some regulations and need assessments took place in national development plans (Egeli, 1996; Okumus, 2002), one of the most comprehensive reports was prepared in 2012 as "Turkey's Sustainable Development Report: Claiming the Future 2012" within the notions of the UN Conference on Sustainable Development (Rio+20). This national report was assembled by Ministry of National Development (MoND) with the contributions of 55 institutions and organizations. In this report, ESD was emphasized in a way that there is a strong correlation between sustainable development and education. It was highlighted that the integration of sustainable development into all levels of education has become an inevitable step to be taken in order to raise awareness of future generations about the interaction between the environment and sustainable consumption. It was also claimed that with the inclusion of the ESD courses into educational programs and curricula, it will be possible to encourage future decision-makers and citizens to embrace sustainable production and consumption patterns.

Compatible with these recommendations in the report (MoND, 2012), an elective course is offered at a public university in Turkey for the purpose of increasing awareness on sustainability among higher education students. The objectives of the 12-week elective course can be outlined as to (1) help individuals to understand how daily life and work can be adopted to help achieve sustainable development; (2) acquire social values, strong feelings of concern for the environment and motivation for active participants in its protection; (3) acquire a personal view of general and global environmental issues; (4) acquire a personal view of general and global environmental issues and sustainable use of natural resources; and (5) ensure that students understand that they are part of the natural circle. The lectures were given based on real stories both in global and national context and examples from daily life. The brief content of the course was given in Table 1.

Table 1.

Content of the Course

Week	Content
Week 1	Welcome – Introduction: What Is Sustainability?
Week 2	Sustainability Milestones: The History and The Need for Sustainability
Week 3	Man and Environment
Week 4	Carrying Capacity of the Earth
Week 5	Water 1: How Much Water Do We Have?
Week 6	Water 2: How Do We Use Water?
Week 7	Unsustainable Consumption of Natural Resources
Week 8	Sustainable Use of Natural Resources
Week 9	Sustainable Use of Natural Resources
Week 10	Sustainable Use of Natural Resources
Week 11	Global Problems: Reasons, Results and Our Responsibility
Week 12	What Is Sustainability?

The data of this study was collected from the students of this elective course. Pre-test was not administered at the beginning of the course since the perspectives on sustainability are relatively new issue in higher education agenda. Although it may seem as a limitation for the study, we assumed that the students who enrolled the course did not have any background on sustainable development and might not develop a sense of self-efficacy on integrating sustainability into their profession and daily life. Instead, we included several self-reported items in the test related to students' background on the concept of sustainable development, and we have reported the results in the results section. Moreover, we examined the essays written by the students as a response to the homework related to their own definitions of sustainable development. Thus, this was how we attempted to support our findings through the results we obtained from implementing SEBIS in exploring the research questions, how students define sustainability and how they integrate sustainability into their profession and daily life.

Participants

The target population was university students who attended the course titled "Education and Awareness of Sustainability" at a public university in Ankara, Turkey in 2014. The accessible population was the students who enrolled in the sustainability course. The instrument was administered to 113 university students from different majors by using convenience sampling technique. Demographic information of the sample is given in Table 2.

Table 2.

The Sample

Variable	Sample	
	f	*%*
Gender		
Female	54	47.8
Male	59	52.2
Grade Level		
Sophomore	2	1.8
Junior	39	39.5
Senior	72	63.7
Faculty		
Faculty of Architecture	2	1.8
Faculty of Arts and Sciences	18	15.9
Faculty of Economic and Administrative Sciences	14	12.4
Faculty of Education	32	28.3
Faculty of Engineering	47	41.6

As displayed in Table 2, 54 (47.8%) of the participants were female and 59 (52.2%) were male. The mean of age of the participants was 22.9 years. Distribution of the grade level in Table 2 revealed that 2 (1.8%) of the participants were sophomore, 39 (39.5%) were junior, and 72 (63.7%) were senior students. Moreover, the participants enrolled in the course were from 30 different majors. 14.2% was from the Department of Mechanical Engineering, 10.6% was from Foreign Language Education and 8.0% was from Elementary Mathematics Education.

Instrumentation

The related literature was examined, and the instrument items were rewritten by the researchers based on the previously developed instrument STEBI-B (Enochs &Riggs, 1990) and translated by Tekkaya, Cakiroglu and Ozkan (2004) on science teaching efficacy beliefs. For the current study, one of the dimensions of the STEBI-B "Personal Science Teaching Efficacy" was used to construct the instrument. The items of this dimension were tailored to sustainability context and constructed to form three dimensions named as Profession Efficacy for Sustainability, Daily Life Efficacy for Sustainability, and Effective Communication Efficacy on Sustainability. Edwards' Criteria (Edwards, 1994) were considered while constructing the items. As a result, 17 Likert-type items measured on a 5-point scale (strongly disagree [1], disagree [2], undecided [3], agree [4], strongly agree [5]) formed the draft version of the instrument. Moreover, the items were written in Turkish.

As STEBI-B were translated into Turkish in previous studies (e.g Akbas & Celikkaleli, 2006; Hazir-Bikmaz, 2004; Onen, & Oztuna, 2006; Tekkaya, Cakiroglu & Ozkan, 2004), no additional translation process was conducted. Instead, in order to provide content validity evidence, expert opinion was taken. The draft items in the item pool and two additional hand-outs (checklist for comparing the original items of STEBI-B and adapted items, and item list within the related dimensions) were sent to two experts who are specialized in motivation in order to guide them while assessing the instrument. Some of the items were rewritten in the light of their suggestions. After the revision process, 17 items were decided to construct the instrument.

Quantitative Data Collection

The instrument including 17 items was administered to 113 participants at a public university in Ankara, Turkey. The data was collected at the end of the semester during the last lecture of the course titled as Education and Awareness for Sustainability. Exploratory Factor Analysis (EFA) was conducted with responses of the participants in order to determine the dimensions of the instrument. The details of the results of EFA and reliability analyses are given in the result section.

Qualitative Data Collection

In order to explore the participants' understanding of sustainability and their ability to integrate this conception into profession and daily life, students were asked to write an assay. The assay question was prepared in order to clarify students' own definition of sustainability and to enable participants to provide examples. The question was "What is your definition of sustainability?" Among the essays, 30 of them were randomly selected for the analysis.

Data Analysis

Quantitative Data Analysis

The answer for the 1st research question of this study was analyzed by means of EFA analysis. On the other hand, in order to answer the second and third research questions, descriptive statistics were performed. The self-efficacy levels of the students were described through descriptive data.

IBM SPSS 20 Statistical Software Program was utilized to analyse the data of the present study. The responses of the items which ranged from strongly disagree to strongly agree were coded from 1 to 5 respectively. Gender is valued with 1 and 2; departments coded from 1 to 30, and grade levels were also coded with the numbers ranging from 2 to 4. In addition, "excluded cases pairwise" is selected to deal with missing data.

Qualitative Data Analysis

Content analysis was used to examine the students' understanding of sustainability. As there are no classification schemes in the accessible literature, the researchers constructed it congruent with the research questions and the context of the study. Merriam (2009) recommended following steps to analyze data: (1) construct categories by coding from data; (2) combine the coding to meaningful categories; (3) order the categories and the data; and (4) name the categories.

Results

University Students' Self-Reports on Their Level of Knowledge of Sustainable Development

Participants were asked if they took another course(s) which contain the concept of sustainable development before enrolling in this elective course. Based on their answers, only 13.3% of them enrolled in a course related to sustainable development. On the other hand, it was also asked if they heard about the term before attending the course and approximately 78% of them stated that they heard about sustainable development from their families, friends, internet, and TV.

Participants were also asked to evaluate their background knowledge of sustainability after they enrolled in the course. As the results presented in Table 3 indicate, almost 86% of the participants reported that they have heard about the concept and know the meaning.

Table 3.

Self-evaluation of the participants related to their level of knowledge of sustainability

	Frequency	Percent
	f	*%*
I have heard the concept "sustainability" and I know the meaning.	97	85.8
I have heard the concept "sustainability", but I don't know the meaning.	2	1.8
I have my own definition of sustainability, but I am not sure if it is true.	9	8.0
I have memorized the definition of "sustainability", but I do not know its content.	1	.9
I know the concept, but I do not know how to apply it.	2	1.8
Others	2	1.8

University students' understanding of sustainability

Essays written by the students on their understanding of sustainability were analysed by content analysis. Students' definitions of sustainability were coded to construct categories as presented in Table 4.

Table 4.

University students 'definition of sustainability: categories

Category	Frequency	Percent
	f	*%*
Human-nature interaction	7	23.3
Conventional Definition (Brundtland Report)	5	16.7
Consumption	5	16.7
Longevity	3	10.0
Survival	3	10.0
Other	1	3.3
More than one category	6	20.0
Total	30	100

As presented in Table 4, approximately one-fourth of the students construct their definitions for sustainability through the notion of human-nature interaction as in the case of P4: *"Sustainability is the collaboration of the human being and the nature"*. Almost 17 % of the students, however, defined the concept through the conventional definition as given in the Brundtland Report as in the case of P19: *"Sustainability makes it possible to hand over the world to the next generations with the least damage."* Other 17% of the participants defined sustainability through natural resource consumption: *"I think sustainability is more related to usage of natural resources"* (P23). Other categories for students' understanding of sustainability were decided as longevity; *"The word sustainability gives us clues about how to maintain our survival."* (*P*13) and *"…means ability to being permanently…"* (P15*)*. Moreover, 20% of the participants' definitions were comprised of more than one category; for example, some of the participants' definitions involved both human-nature interaction and conventional definition: *"Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony that permits fulfilling the social, economic and other requirements of present and future generations."* (P28).

Students' definitions were also analyzed related to their explanation of their way of integrating sustainability in daily life and profession. As a result, it was found that 21 of 30 students have integrated sustainability into their daily lives through changing their consumption patterns. For example: *"I decided to start from myself at least and do something individually for sustainability. For example, I reduced the amount of water I use during bath. I don't waste rough papers anymore and so on."* (P7). On the other hand, only 3 participants (out of 30) mentioned integrating sustainability into profession while making the definition of the term: *"The Bank of America proved that it's possible to make profit and preserve the resources at the same time."* (P17). Besides, only one participant mentioned integration of sustainability both into daily life and profession: *"I try to make sustainable choices when I go shopping. What inspired me for such a choice is the project I have participated during my internship at Metro Cash & Carry.*

Thanks to such projects that make customers and people be aware of sustainable choices (P9).

Dimensionality of the instrument (SEBIS)

Exploratory factor analysis was administered in order to examine the construct-related validity evidence of the instrument. The percentage of missing values for each variable was lower than 10 %; therefore, all missing values were replaced with mean scores (Pallant, 2007). Before conducting EFA, Bartlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were tested to provide assumptions for factorability. Bartlett's test of sphericity produced a value (*p=.00)* indicating a normality assumption. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy index was found to be 0.86 which is sufficient to perform EFA.

In order to decide the number of components, principle component analysis (PCA) with unrotated solution was conducted in the initial phase. In the second phase, factors were rotated with the oblimin rotation method to make meaningful interpretations for the dimensions.

At the first trial, PCA yielded 4 components with eigenvalues that are greater than 1.0 as displayed in Table 5. Pallant (2007) denoted that scree plots produce better results for conditions in which many components were extracted based on eigenvalues (Figure 1). Accordingly, scree plot for this study revealed two factors, which explained 53.6 % of the variance with respect to eigenvalues. Overall, two dimensions were represented by the instrument items suggest that factor loadings are higher than 0.30 (Pallant, 2007). Pattern matrix of the pilot instrument is given in Appendix 1.

Table 5.

Initial eigenvalues of the dimensions of the self-efficacy beliefs on integrating sustainability instrument

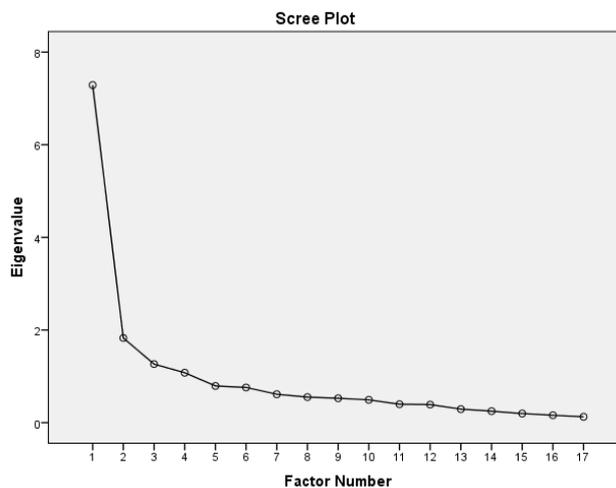| Component	Initial Eigenvalues		
	Total	*% of variance*	*Cumulative%*
1	7.288	42.869	42.869
2	1.828	10.750	53.619
3	1.264	7.435	61.054
4	1.078	6.339	67.394

Figure 1. Scree Plot

A total of 11 items loaded in the first dimension were related to self-efficacy beliefs on integration of sustainability into daily life. Based on the similar characteristics of items, the dimension was defined as *Daily Life Efficacy for Sustainability*. On the other hand, the other six items were about self-efficacy beliefs on integration of sustainability context in profession. Hence, this dimension is defined as *Profession Efficacy for Sustainability*. As a result, although we began with proposing three dimensions, EFA results revealed two dimensions. Moreover, Cronbach's alpha values were calculated. Besides, reliability analyses were replicated by selecting items from the same dimension. Item-total statistics is given in Appendix 2. The dimensions and Cronbach's Alpha Values were given in Table 6.

Table 6.

Dimensions of the self-efficacy beliefs on integrating sustainability instrument

Dimensions	Items*	Cronbach Alpha
Daily Life Efficacy for Sustainability	2,5,6,8,9,10,11,13,15,16	.88
Profession Efficacy for Sustainability	1,3, 4,7,12,14,17	.89

* Please see the items in Table 8 & Table 9.

University Students' Self-efficacy beliefs related to integrating Sustainability into daily life and profession

Self-efficacy belief scores on integration of sustainability into profession and daily lives were estimated through descriptive statistics. The means and standard deviations were reported for each dimension of the instrument in Table 7.

Table 7.

Results of Descriptive Statistics

Dimension	Mean	Standard Deviation
Daily Life Efficacy for Sustainability	3.81	0.54
Profession Efficacy for Sustainability	3.76	0.73

Looking at the first dimension, the mean score of 3.81 over 5 (s = 0.54) displayed in Table 8 indicated these participants have high self-efficacy beliefs on integrating sustainability context into their daily lives. As presented in Table 8, more than 80 % of the university students believe that they will always find better ways to incorporate sustainability into their daily lives (item 5). With a similar percentage, they reported that they know what to do while integrating sustainability into their daily lives (item 13). On the other hand, more than one fourth of the respondents are undecided about their level of knowledge and skills on sustainability (28.5%); finding better methods to explain sustainability to other people (24.8%); explaining to people why sustainable life style is better (26.6%), and answering questions of people (23.9%) about sustainability. Therefore, according to the results presented in Tables 7 and 8, we can infer that

although participants of this study have high self-efficacy beliefs about integrating sustainability into their daily life style, they are "undecided" about the reason why sustainable life style is better (item 16); how to explain sustainability (items 15, 11, and 6) and how to integrate sustainability into daily life (items 10 & 2).

Table 8.

University students' self-efficacy for integrating sustainability into daily life: results of descriptive analysis

Translation of the Items	Frequency (%)		
	Disagree	*Undecided*	*Agree*
16. I find it difficult to explain to people why sustainable life style is better.	63.7	26.6	9.7
15. I can always find better ways to explain sustainability to other people.	5.3	24.8	69.9
13. I do not know what to do about integrating sustainability principles into my daily life.	82.3	12.4	5.3
11. I have skills and knowledge that would allow me to explain sustainability concepts to people.	6.3	28.5	65.2
10. I have skills and knowledge that would allow me to aggregate sustainability context into my daily life.	6.2	23.0	70.8
9. Even when I try very hard, I won't be able to explain sustainability to other people.	75.0	17.0	8.0
8. I am not very effective in including sustainability principles in my daily life.	75.0	16.1	8.9
6. I am typically able to answer people's sustainability questions.	5.3	23.9	70.8
5. I can always find better ways to integrate sustainability in my daily life.	3.5	15.1	81.4
4. Even when I try very hard, I won't be able to include sustainability into my daily life.	91.8	4.5	3.6
2. I don't know what to do to persuade people to have a sustainable life style.	55.0	27.9	17.1

Looking at the second dimension, the mean score of 3.76 over 5 (s = 0.73) displayed in Table 9 indicated these participants have also relatively high self-efficacy beliefs on incorporating sustainability into their profession. Table 10 represents the frequencies of the responses for the items of the second dimension. The findings revealed that more than 70% of the university students believe that they will always find better ways to incorporate sustainability context into their profession (item 17). With a similar percentage, they hold the beliefs that they have necessary knowledge and skills (item 12). Furthermore, nearly 65% of the university students reflected that they know what to do to integrate sustainability into their profession (item 1). On the other hand, more than one third of the respondents' are "undecided" about their level of understanding of sustainability context to their profession (item 7). Hence, according to the answers presented in Tables 7 and 9, we can infer that even though participants have high self-efficacy beliefs on integrating sustainability into profession, they remained "undecided"

about their level of understanding that enables them to integrate sustainability context into their profession.

Table 9.

University students' self-efficacy for integrating sustainability into profession: results of descriptive analysis

Translation of the Items	Frequency (%)		
	Disagree	*Undecided*	*Agree*
17. I can always find better ways to integrate sustainability into my profession.	10.6	16.8	72.6
14. Even when I try very hard, I won't be able to include sustainability to enrich my career as effectively as I do with most subjects.	75.9	15.2	8.9
12. I wonder if I have the necessary skills to integrate sustainability context into my profession.	8.0	17.9	74.1
7. I understand sustainability concepts well enough to be effective in integrating them into my profession.	15.7	31.5	52.8
3. I cannot include sustainability context in my business life because it needs to be done by specially trained people.	77.0	13.3	9.7
1. I know the necessary steps to include the sustainability context into my profession effectively.	14.2	21.2	64.6

Discussion and Conclusion

Dimensionality of the SEBIS Instrument

According to Gravetter and Wallnau (2009), EFA was used to examine the dimensions of instruments. Accordingly, EFA was used in the current study by the use of the statistical software, Statistical Package for the Social Sciences (SPSS) version 20 in order to analyse the instrument's dimensionality. According to EFA results, 2 dimensions emerged as *Daily Life Efficacy for Sustainability* and *Profession Efficacy for Sustainability.* The total variance explained by these dimensions was found as 53.4% that may be considered as the power of the dimension configuration of the instrument (Cokluk, Sekercioglu, & Buyukozturk, 2012). Furthermore, all rotated factor loading values of the items were found as higher than 0.3 revealing a strong relationship among the items and the dimensions (Stevens, 2002). Moreover, loading

of the all items in one dimension can be interpreted as construct-validity evidences for the present study. Since evaluating EFA results alone is not enough to confirm the dimension configuration of the instrument, it was necessary to run confirmatory factor analysis (CFA) through the sample with similar characteristics. Therefore, further studies are needed to have more validity and reliability evidences for the instrument. After confirming dimension structure, this instrument can be used for further research to identify the level of self-efficacy of individuals towards incorporating sustainability context into their life. Moreover, this instrument could serve well as a pre-test and post-test to determine the change in self-efficacy belief levels by enrolling in sustainability lectures. Besides, this instrument may be used in any higher education program including sustainability context.

University students' understanding of sustainability and their self-efficacy levels on integrating the concept into their profession and daily life

Literature examining level of knowledge of the students on ESD generally suggested that they have enough background knowledge (Emanuel & Adams, 2011), but lack holistic interpretations of the concepts (Sahin, Ertepinar & Teksoz, 2009). Moreover, several studies clearly addressed that most of the students describe ESD based on the interaction with the environment, and they were not be able to consider the other aspects of the sustainability (Tuncer, 2008). When the results of this study were compared with the literature, 85% of the university students who participated in our study reported that they had heard the concept "sustainability", and they knew the meaning of it at the end of the course. On the other hand, their responses about the definition of sustainability revealed that there is still a dominance of the aspect of environment in their description of sustainability. Nevertheless, if the essays of the students are explored in depth, they mention the economic and social aspects implicitly such as daily consumption habits and their effects on the domestic economy and quality of their life correspondingly. Yet, they need to proceed to the next stage which requires holistic approach to sustainability issues. Hence, it can be concluded that these results are moderately compatible with the literature and pave the way for further studies which could focus on exemplification of the students while describing their sustainability conception.

As described in the introduction section, self-efficacy beliefs affect individuals' accomplishment of courses of action, performance, and their persistence throughout the process (Bandura, 1977). People who have high self-efficacy beliefs have a tendency to take on more challenging goals, to overcome possible problems, to determine how to overcome these challenges (Bandura, 1977; Pajares, 1992) and to have higher level of motivation (Locke & Latham, 1990). In this study, we aimed to explore the level of self-efficacy beliefs of university students after completing the sustainability course at a public university. Based on the results (please see Table 8), university students who participated in this study (42% engineers; 28% education; 16% arts and science; 12% economics and administrative sciences) think that they have the necessary knowledge and skills to integrate sustainability context into daily life, they can answer people's questions on sustainability, and they can find better ways to explain sustainability context to other people. However, they remained undecided about having necessary skills and knowledge to convince other people to integrate sustainability into daily life.

When the essays were examined, the number of participants who integrated sustainability concept into daily life was about 21 out of 30. These results were in line with the course content: The lectures were based mainly on real cases on sustainability or unsustainability. Therefore, lectures related to the experiences of people from different countries of the world might have inspired the students to set their own point of view. For example, they exemplified how sustainable lifestyle is possible

through regulating daily consumptions such as (1) reducing the amount of water they use, (2) eliminating the usage of plastic bags while shopping, (3) reducing electricity consumption, and (4) not buying the products they do not need. This is not a surprising result since these concepts were addressed during the course that they attended. For example, one of the topics in the course was related to sustainable consumption patterns (food consumption, water consumption, energy consumption etc.) and 5 of the students among 30 explained sustainability through changing consumption patterns. Hence, we can infer that the course content inspired students about how to integrate sustainability into their daily lives.

On the other hand, despite relatively high self-efficacy level for integrating the sustainability into their profession, most of the students failed to explain the ways of integration. Even though they declared that they can integrate the sustainability context into their profession, they did not exemplify how to do it in their essays. The reason for failing to explain how to make the integration may be that there is no attempt in their major departments to integrate the concept into their profession. Hence, they have no related inspiration or visualization. Besides, 85% of the students declared that they know the meaning of sustainability. However, as the results displayed, one third of them have doubts about integrating it into profession and convincing other people to live sustainably. At this point, we recommend that major specific courses given in all faculties shall include sustainability concept as well as good examples about integrating the concept into profession.

As a result, one can infer that students' understanding for integrating sustainability into practice may be shaped by course content and may give a clue on how course contents may be revised accordingly. Thus, these results may provide feedback for lecturers about how to use the power of courses to improve students' understandings of integrating sustainability into their lives. Nevertheless, the situation arose from this research is that in spite of having high self-efficacy to integrate sustainability into daily life and profession, the reason for the university students being undecided about how to explain the concept to the other people and how to integrate into their profession requires to be studied further.

Although there is no specific study for the self-efficacy beliefs on the integration of sustainability both into profession and daily life, there are examples in the literature the results of which may support our results. For instance, these studies reported that university students have positive attitudes towards having a sustainable life style (Sahin, Ertepinar & Teksoz, 2008), that they have admitted to take action (Tuncer, 2008), and that they have enough background knowledge (Emanuel & Adams, 2011), but do not have holistic conceptions of sustainability (Tuncer, 2008; Sahin, Ertepinar, & Teksoz, 2008). Nevertheless, they are reluctant to engage in sustainable life style (Sahin, Ertepinar & Teksoz, 2008; Emanuel & Adams, 2011), thus more courses and/or improvements in the current ones are needed (McCormick et al., 2015; Tuncer, 2008; Sahin, Ertepinar & Teksoz, 2008; Parrot et al. 2010). Besides, all of these studies reached a conclusion that further studies should explore some other variables that may affect students' self-efficacy beliefs.

■   .   .

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RESEARCH ARTICLE

Ecological Dynamics Model and Ecopedagogy-Based Outdoor Experiential Education

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Abstract

Environmental awareness is evaluated related to cognitive and affective areas so it might be considered one of the important points in order to predict environmental behavioural change. One of the behavioural change models is ecological dynamics model (EDM) and this model's characteristics overlap with ecopedagogy-based outdoor experiential education (EOEE) and the titles of Agenda 21. The aim of this study is to examine the efficiency of an EOEE program intended for in-service teachers on environmental awareness and to evaluate EDM within EOEE. Mixed methodology was used and the data were collected by an environmental awareness scale, participants' diaries, non-participant observation, and meeting documents. The study found that the participants developed environmental awareness and tended to have holistic perspective at the end of the education. It is come up with that holistic perspective may be added to the EDM and this model can be checked out by mathematical models such as structural equation modelling.

Keywords: ecopedagogy, ecological dynamics model, environmental awareness, outdoor experiential education, in-service teachers

Introduction

The main aims of environmental education for sustainable development according to Agenda 21 are to achieve improvement of environmental awareness, values and attitudes, behavioural change and participate in decision making process (UN, 1992, 320). Agenda 21 emphasizes some other important points in order to increase environmental awareness: in-service teacher training programmes (p. 321), curricula which is based on activities (p. 323), a multidisciplinary approach (p.321) and innovative teaching methods (p.322). 36.24 (p.328) coded title mentions an 'exchange of experience concerning training and awareness programme' and this title is the spark point and the main scope of this research.

Achieving environmental behavioural change is not easy therefore the research in environmental pedagogy focuses on some steps such as environmental knowledge, environmental awareness or environmental attitude. Some researchers have also come up with models (US linear model; sociological models; altruism, empathy, prosocial behaviour models, model of pro-environmental behaviour, EDM) in order to achieve behavioural change (Burges, Harrison & Filius, 1998; Eisenberg & Miller, 1987; Kollmuss & Agyeman, 2002; Brymer & Davids, 2013).

Kollmuss and Agyeman (2002, 257) especially place 'environmental awareness' into the pro-environmental behaviour model. The distinctive points of this model is to evaluate environmental awareness either with a knowledge- based component (cognitive) or perception based component (affective). Hence this study tries to interpret 'environmental awareness' an important point to predict behavioural change because environmental awareness affects both learning areas and might be seen as a bridge between cognitive and affective learning areas to kinaesthetic area. The aim of this study is to examine the effects of an outdoor environmental education programme on the environmental awareness of in-service teachers. Following that the paper will discuss the ecological dynamics model and evaluate the use of an ecopedagogy philosophy in order to develop an outdoor education programme.

Ecological dynamics model (EDM)

The environmental issues in environmental pedagogy are very complex (Misiaszek, 2015). Brymer and Davids (2013) suggest to use EDM in order to overcome this complicated way. EDM is based on experiential learning and has three important points: individual learning, environment (social and physical), and task. According to this model there is not any 'one size fits all' environmental educational programme because the background of every person is different to each other therefore outputs of people might be varied. People even can reflect same output in a different timescale. In addition, acquisition of people can be achieved by direct social (social environment) and natural environment (physical) interactions. People should be in a social dialog and carry out directly activities in nature. Moreover, these activities should be related to the daily life and people should be a part of the activities (Brymer & Davids, 2013). Brymer and Davids (2013)'s article only explains the theoretical framework of this model. However the characteristics of EDM overlap with EOEE and the title of Agenda 21. (Table 1)

Table 1.

Comparison of Agenda 21, EOEE, and EDM

	The title of Agenda 21	*EOEE*	*EDM*
a. Aim group	In-service teacher	In-service teacher	Individual learner
b. Programme characteristics	Curricula based on multidisciplinary approach and activities	Ecopedagogy-based curricula with community in practice	Environment -Social environment -Physical environment
c. Method	Innovative teaching methods	Outdoor experiential education	Task

EOEE (Ecopedagogy-Based Outdoor Experiential Education) Programme

The main aims of Agenda 21 refer to transformation of the society (Misiaszek, 2015). However this transformation is related to critical thinking about how to solve socio-

environmental problems. There are two main points here: society and environmental problems. Misiaszek (2015) points out that ecopedagogy is a valuable pedagogical perspective in order to understand and teach complex relationships between society and nature. EOEE is therefore one of the pedagogical tools in order to teach environmental issues.

EOEE programme with community of practice is the social side of this research. Ecopedagogy is a critical approach towards political, ideological and economic events within education (Antunes & Gadotti, 2009; Kahn, 2010). The key points of ecopedagogy include protection of natural environment (natural ecology), the impacts of human upon environment (social ecology) as well as the influence over civilization and economic, social and cultural composition (integrated ecology). The social interaction side of EOEE programme is community of practice.

Etienne Wenger has also put special emphasis upon education within a society. Etienne Wenger's (2004) conceptualization of 'community of practice' is defined as a learning of cooperation with a constructive approach (Johnson, 2001) and is considered as restructuring of the knowledge by praxis in a social environment (Baran & Cagiltay, 2006). In fact, community of practice is not a new perspective. Even though it was first introduced in the field of industry, this perspective is said to be traceable back to many centuries ago (Wenger, McDermott & Snyder, 2002). Community of practice is first determined as a field of subject which gather a group or community together; a group of people sharing the same goals and ambitions; the knowledge is learned via cooperation which is based on practice; knowledge and abilities are shared and may transmit from person to person (Wenger. 2004).

The features of the community of practice and the goals and content of the EOEE overlap in many respects. In the EOEE, a group of selected participants are gathered together to make sure that they learn the language of nature and subsequently develop holistic approach (Ozaner, 2004). In terms of selected participants, Misiaszek (2015) especially emphasizes that ecopedagogy might be use in teacher education because teachers should teach complex environmental issues rather than environmental knowledge. Three major titles stand out here: (a) a group of selected participants such as in-service teachers, (b) EOEE, (c) learning by practice. These three titles are also the main components of TUBITAK (The Scientific and Technological Research Council of Turkey) 4004 coded projects at the same time. In addition, TUBITAK has been financed EOEE programs intended for in-service teachers since 1999 (Erentay & Erdogan, 2009) in Turkey and expects projects to explain complex environmental issues with activities in nature via daily speech.

Literature review

There are studies related to EOEE intended for teachers within TUBITAK projects however the studies related to experimental application of EDM are very limited (Okur-Berberoglu, 2014). This research is just limited within TUBITAK 4004 coded projects because these projects are based on EOEE and the community of practice.

Guler (2009) managed an outdoor experiential education projects intended for in-service teachers in 2008. There were 24 in-service teachers at the project which was for 12 days. The aims of the research were to figure out expectations of in-service teachers from the project, to determine self-efficacy level of teaching about environmental subjects, and to determine the change of personal ideas about environmental education. The project data was collected by semi-structured interview and analysed by discourse analysis. As a result, the participants disclosed that their expectation form project was to have environmental knowledge, and they had it. They

also expressed that they were very glad to have favourable perspective to the world, they sensed more responsible to the natural environment, and they would explain and teach what they had learnt.

Keles, Uzun, and Varnaci-Uzun (2010) carried an outdoor experiential education projects intended for in-service teachers in 2009. 25 pre-service teachers attended to the project which was for 10 days. The aims of the research were to figure out environmental awareness and attitudes of the participants by quantitative approach. The scales were applied as pre/post/postpost test (after 3 months). As a result, it was determined that environmental awareness of the participants was increased, and environmental attitude was changed as favourable.

Eryaman, Yalcin-Ozdilek, Okur, Cetinkaya, and Uygun (2010) managed an outdoor experiential education projects intended for in-service teachers in 2009. The project was for 10 days. The participatory action research was used. The aim of the project was to determine tendency of the participants to take active role in order to solve environmental problems. As a result, the researchers found that the participants were very enthusiastic in order to take active role in order to solve any environmental problem. However the researchers stated that they could not follow up the participants. This was the limitation of the research.

Yalcin and Okur (2014) carried out an experiential education about electromagnetic area (EMA) within an outdoor education project in 2010. The project was ecopedagogy-based and for 10 days. There were 24 in-service teachers as participants. The triangulation mixed methodology was used within a case study. The participants were followed up after six months. The data was collected by the electromagnetic field awareness scale, diaries of the participants, the interview documents and 6th month following up data. It was identified that the participants' awareness was developed throughout the education and they tended to be careful about using of electrical devices in their daily life.

Okur-Berberoglu (2014) examined whether EDM within an EOEE programme was successful in order to achieve ecological behaviour change, direct and indirect actions. She carried out an EOEE project intended for teachers in 2011. The project was for 10 days and 24 in-service teachers joined to the programme. The qualitative approach was used within a case study. The participants were followed up after six months. She found that EDM within an EOEE programme was successful in order to achieve ecological behaviour change, direct and indirect actions.

Okur-Berberoglu (2015) tried to determine the effect of an EOEE on environmental awareness. The methods of the research was one group pretest-posttest quasi-experimental design without control group. The methodology of the research was quantitative approach. An awareness scale was carried out to 27 in-service teachers. The coefficient of Cronbach reliability was 0.891. The total scores having from pretest and posttest were analysed by Wilcoxon signed rank test, and a statistically meaningful difference was found. According to this result, EOEE was effective in order to increase environmental awareness.

As seen above the research aimed different points of the environmental education but none of them mentioned EDM except Okur-Berebroglu (2014)'s study. The aim of this study is to examine whether EDM within an EOEE programme is successful in order to develop environmental awareness.

Method

The data of this study was gathered from the project, of which it is named as 'Ecology in Canakkale and Suburbs, 2010.' Triangulation mixed methodology within a case study was used in the research. Qualitative and quantitative data were collected simultaneously.

Education programme

The education program was designed as an academic programme for 10 days in line with the ecopedagogic approach as well as the objectives of the science-society projects (TUBITAK Call for Paper 2010, 1-2). The goals of the academic programme are to ensure that the participant becomes part of the knowledge, perceive the nature as a whole and think like a scientist (McNeil, 1996). Within the academic program, knowledge and information are disseminated from simple to complicated version and connection with the other disciplines (McNeil, 1996). Bruner (1966) also expresses support for an academic perspective for the programs. The biggest criticism to the academic program is that no every teacher can be as knowledgeable as a scientist in any given subject (McNeil 1996). However, the educators were picked up in terms of community of practice. Different scholars from 21 different disciplines were brought together to create a learning environment of social and cognitive perspectives within the same goal.

The subject matters of the project included production of compost out of domestic organic waste, vertebral animals in Canakkale and its nearby towns, the geological history and outlook of the same vicinity, the endemic flora in the region, the river ecology, its importance and features, the Troy National Park since the Prehistoric era, ethno-botanic, seaweed and their crucial importance, the historical importance of Canakkale, underwater and sea ecology, underwater scuba-diving, ecotourism, the climate and aerial aspects of the region, electromagnetic field created by man and environmental safety and health, astrophysics, Can coal basin and water resources, ecological footprints, the role of insects in protection of the nature and biological combat, and deep ecology. For example the educator who lectured the 'vertebral animals in Canakkale and its nearby towns' lesson directed an activity at Kalkim Village. The educator demonstrated how to catch a vertebral animal at the area and wanted the participants to catch some vertebral animals. The participants found mostly tortoises and lizards but could not find any snake therefore the educator used the snake samples which were fixed in formaldehyde in order to show to the participants. (App 1)

Quantitative data collection and environmental awareness scale

Quantitative data was collected by an environmental awareness scale. The explanatory and confirmatory factor analysis were carried out in order to develop the environmental awareness scale. It was found that factor loads of items were 0.30 or above, the KMO was 0.867, the Bartlett Dimensionality test was 0.000, Cronbach Alpha reliability coefficient was 0.826.

Goodness of fit results were X2 /sd: 2.84, RMSEA: 0.073, SRMR: 0.056, CFI:0.90, IFI:0.90, GFI:0.91, and AGFI:0.87. These results confirmed that the validity and reliability of the scale was 'good' (Sencan, 2005; Buyukozturk, 2007) and the scale was theoretically strong (Simsek, 2007). The awareness scale had one dimension and it

was named as 'human ecology'. The last version of the scale was shown at Appendix 3.

Data analysis

Kolmogorov-Smirnov, Wilcoxon signed-rank, and effect size were calculated for the data analysis. Normal distribution of the data was checked out by Kolmogorov-Smirnov test. This test is preferred to confirm that the data do not show a normal distribution even if the number of samples in the research is less than 30. If 'p' significant value is above .05 within Kolmogorov-Smirnov test, it means that the data shows normal distribution (Buyukozturk, 2007). The p value was less than 0.05 within Kolmogorov-Smirnov test in this research therefore it was decided that the data did not show normal distribution and non-parametric tests were used for the analysis.

The data of the pre-post tests were analysed by the Wilcoxon signed-rank test. This test is used within repeated measures which are carried out to the same group and the data do not show normal distribution. The effect size was also calculated in order to evaluate the impact of independent variable on dependent variable. (Peers, 1996; Huck, 2004; Buyukozturk, 2007).

Qualitative Data Collection Method

Yildirim and Simsek (2006) emphasize that qualitative approach is an effective tool in order to better understand human behaviour. They also note that case study is a useful method in order to collect data on events and individuals (Yildirim & Simsek, 2006) and to draw definitive and explanatory conclusions (Morgan, Hamilton, Bentley, & Myrie, 2009) within qualitative approach. It is also underlined that case study is a reliable method in the literature to have a deeper understanding of the events (Schmitt, 2005; Yildirim & Simsek, 2006; Mitchell, 2008; Robinson, 2008).

The qualitative data was collected by participants' diaries. The researcher asked them to write down on a daily basis what they had learnt during the day, how they were planning to use these skills in their daily and professional lives, and how they felt about their daily acquisitions. It was aimed that the participants could make an independent and impartial comment on the programme and activities (Morgan et al., 2009). Morgan et al. (2009) note that individuals may express themselves more accurately when they make expressions independently and freely. A project meeting was held with the participants at the end of the programme. It was asked them to share their experiences about what was the most influential and amazing part of the project for them, and how they would plan to share their acquisition in their social, professional, and daily life in the future. The meeting was tape-recorded and transcribed after the meeting.

It is noted that additional techniques should be used in order to have more reliable qualitative data (Yildirim & Simsek, 2006; Morgan et al., 2009). One of these techniques is observation (Zanovello, 1999). Bas and Akturan (2008) recall that researcher might not be able to spend his/ her whole time with the participants or that the participants may act differently when they are with the researchers. Hence the project director and 4 project assistants observed the participants during the programme and took notes. At the end of the project, the diaries, the transcripts of the meeting, and the observation notes were analysed by content analysis.

Participant selection

TUBITAK wants greater involvement and participation of students, teachers, and civil servants who work in rural areas as well as graduate students in the target group for an

effective and reliable outcomes. The call for application in 2010 asked participation of the teachers working in the Darüşşafaka Education Institution, Childcare Institution regional boarding schools (YIBO) (TUBITAK Invitation Paper, 2010, 3). The priority was given to the teachers from the YIBO schools.

A survey was designed in order to select participants. A paper which explained the aim of the project and the survey e-mailed to all primary and secondary schools' e-mail accounts. It was asked the in-service teachers to write down an essay related to why they wanted to join to the project. All essays were collected via e-mail. The project director selected the participants according to the essays. She especially focused on learning enthusiasm of the participants about environmental subject on the essays. The total number of participants in the project was 24; 13 of them were male, 11 of them were female. The demographic characteristics of the participants were presented at Appendix 2.

Findings

It was found that there was statistically significant differences between pre and post-tests of the participants (z = -2.665, p<.05, r: 0.55, Table 2). It was evaluated that EDM within EOEE programme had high effect in order to increase environmental awareness. The following statements also supported this finding.

Table 2.

Comparison of the pre/ post tests total points by Wilcoxon signed-rank test

Post-test-pre test	n	Mean Rank	Sum of Ranks	z	p
Negative line	6	7.42	44.50	-2.665*	.008
Positive line	16	13.03	208.50		
Equal	1				

* Based on negative lines

Participant no 3 made the following statement after solid waste activity. He explained how raised his environmental awareness:

I have had first-hand information during the education about solid waste, how they emerged and how it should be handled and destroyed. I never realized how it was processed in our country; I had opportunity to ponder over how it was recycled or how its harm to the environment was minimized.

3rd participant mentioned second activity which was called 'Compost production from home waste' in the programme. The participants carried out compost process during the programme. The project team collected organic waste except meat from the hotel's kitchen. The participants collected dry grass from the hotel garden and filled up a container with the organic waste and dry grass. They also set up an oxygen motor into the container and measured the temperature of the inside of the container every day. At the end of the programme the participants evaluated the last form of the compost and temperature change with the lecturer. The lecturer especially emphasized the local and global effects of the compost and waste management, and daily life effects of them.

'Electromagnetic area (EMA)' activity had also impact on improving environmental awareness. It became apparent that the education on human-made EMA has

influenced the participants. During the training, the participants received theoretical knowledge while they also have experienced the electromagnetic influence and the power of the household applications such as computer and hair drier. Participant no 7 made the following statement on EMA:

I realized that we have intense contact with electromagnetic area. We live with the tools that we call indispensable. I learned what sort of measures I could take. I was particularly amazed by the potential danger posed by the hair drier.

The participants measured EMA level of some daily life devices, cables of wind stations, and cables of the classroom by a gaussmeter. People have installed electrical cables in a room or under soil. We do not see these cables however EMA spreads out over soil or wall. People have to use the electrical devices in their daily life but also learn how to protect themselves or minimize the negative effects of EMA. It is so clear that people are impressed very much when they are exposed to some negative effects directly. The activity was very impressive because they can see directly the invisible effect by the gaussmeter.

The other most inspiring activity was the 'Vertebras in and around Dardanelles'. Participants no 1 referred to this activity and said that it changed their minds on nature.

Participant no 1 made the following statement on the matter:

…..I had prior prejudices because I was not good at the animals; this has significantly changed owing to the professor. I never put myself in the place of the animals. I learned some new terms on vertebral animals. I went beyond my limitations in the practice session. I even touched a snake. I was pretty nervous before the class; but now I am perfectly fine. I also acquired extensive information on how to discern these animals.

The participants went to Kalkim region for this activity. The lecturer firstly explains how to catch a vertebrata around this place and wanted participants to catch a vertebrata. The participants caught turtles and lizards. They could not catch snake because of applying activity in the morning time. The lecturer also brought fixed specimens and some of them firstly touch to a vertebrata or snake. The most interesting specimen for the participants was to see lizard without tail because they thought that every creeper thing without tail was a snake. Most of the people put down these lizards although they were harmless. The participants had knowledge and were aware of importance of these animals for the world because they also learned the meaning of 'endemic species'. Participant no 2 made the following statement on the importance of endemic:

The notion endemic has been involved in my life. I have a better appreciation of how the species are protected, under what conditions they are hurt. I will teach this to my students to raise better climbers.

The other important activity was the 'Deep ecology'. In fact this activity covered all the other activities. It may be considered a kind of ecological philosophy. 9th, 11th, 15th, and 23th participants reflected their environmental awareness within the deep ecology at the last meeting of the programme. Participant no 9 made the following statement on his environmental awareness:

People develop attitudes towards the nature based on their profession or experiences; for instance, I majored in physics; after that, I took some advanced education. I realized that everybody here was devoted to education on a voluntary basis. Of course, I already knew that I had a lot to catch up during this process. I was particularly aware that my knowledge on biology was pretty poor; so during the course, I had a chance to fill this gap. I think I did amazing in this endeavour. Like I said, I tended to think by formula; but it is amazing to see that there are a lot in the nature affecting everything

going on around you. So this course has been particularly helpful to me in understanding the nature and the universe.

Participant no 11 expressed his feelings on awareness as follows:

I talked to my friends before; I am actually fond of nature; I truly love animals, the flowers, the trees and the plants; I really care about the nature. I remember myself sobbing because I witnessed mass killing of street animals. Because I am extremely concerned about the environment, I am really careful about dumping and littering. But I did not know I had actually a lot more to learn; this course made me realize there are a lot more to think about on nature and environment. This project made me see that the circle was actually bigger and larger than I used to think.

The following was a statement by participant no 15 on his environmental awareness:

Above all, I should note that the biggest benefit of this programme is its ability to address my prejudices. I have often stood against the people's reaction against, say, gold mining, or exploitation of natural resources for energy. I assumed that somebody was actually manipulating these people. I still think this is actually a possibility in at least some occasions. But I noticed during the project that such activities actually do harm on nature and the natural habitat of animals down there. I always say this: Turkey is more important to me; but it turns out the future of these animals was also important; and I realized this at this programme.

Participant no 23 siad his integrated approach towards nature by reliance on the notion equality:

I realized that I had some prejudices I have to get rid of. Everything in the nature plays a role whether you like it or not. All living things in the world are equal.

It was obvious that EDM within EOEE has increased environmental awareness of the participants and they have started to get holistic perspective to the natural environment. They realized that we were not alone in this world and universe (9th and 23th) and the environment was a complicated system with the biotic and abiotic components. In other words, these expressions were related to human ecology.

Discussion and Results

First and foremost, it was found that the EDM within EOEE was successful in order to develop environmental awareness. This result is coherent with the literature (Keles et al., 2010; Yalcin & Okur, 2014; Okur-Berberoglu, 2015) however the research did not mention EDM. It is obvious that the EDM and EOEE have similar theoretical framework (Table 1) and also the main characteristics of the EDM and TUBITAK 4004 coded projects overlap. Brymer and Davids (2013) just explained theoretical framework of EDM therefore at the first stage I examined the EDM on TUBITAK projects however these findings should be confirmed with other research. EOEE might be evaluated in terms of a kind of application of EDM.

Moreover, Okur-Berberoglu (2014) found that the EDM was successful in order to achieve behavioural change, direct, and indirect actions however only one result is very insufficient. She also followed up the participants after six months. In addition, the most remarkable limitation of this research was that not to have following up process. Following up process is important in order to determine behavioural change however I could not follow up the participants because of the project conditions. Researchers may investigate long-term effects of the EDM and EOEE in terms of environmental awareness, holistic perspective or behavioural change. Above all, it is obvious that the EDM and EOEE have common points and these points should not be ignored.

EDM focuses on individual learning however it also comes up with learning might be happened in a social area. An educational programme was carried out in this research however it does not mean 'one size fits all' because EOEE is based on critical thinking. It was succeed to increase environmental awareness, on the other hand individual outputs might be different to each other. The participants mention different subject (Findings). It might be related to the field of interests. David Irwin (2010) emphasizes that the role of educator in an outdoor experiential education is to stir the mind about environmental subjects/ problems; not to say what is true/ false. The participants should think ontological at the end of programme what I can do for the environment (Okur, 2012). Every environmental behavioural change model should be tested. Chawla (1999, 24) says that researcher cannot find a final unchanging behavioural model because each research has a social side. If there are almost 8 billion people all over the world then we may have 8 billion outputs. It was understood that the education programme of this study could stir the participants' mind about the complex relationships among the environmental subjects.

Furthermore, the participants tend to get holistic perspective within environmental awareness at the end of the programme. The views of the participants no 9, 11, 15 and 23 particularly confirm that some progress is made with the respect to development of a holistic approach. Participant no 9 majored in physics and currently works as a teacher of science and technology. He noted that they were trying to explain everything by formula and equations in physics education, adding that he realized at the programme that there were a lot of variables that require something greater than equations and formulae. This is further testified by a statement that participant no 11, a math teacher, made. McCallum (2008) recalls that reliance on a positivist approach to explain the universe via equations in the history of science has negatively affected the integrity of the nature. In other words, one single event may lead to several conclusions or vice versa. Participant no 15 realized that he was able to identify the complex relationship between the industry and ecology. In other words they are able to discern taking a look and seeing. This result is very impressive because the aim of the research is to increase environmental awareness however the environmental awareness explanation of Kollmuss and Agyeman (2002) may be effective to develop holistic perspective.

In addition, Kollmuss and Agyeman (2002) considered environmental awareness with cognitive and affective learning area. This study's programme might be effective on both areas because activities were related to the daily life. It was particularly determined that the participants were attracted to the EMA issue which made their minds to stay away from the EMA impacts. Apparently, the participants were influenced by the informative session on EMA because of its impact on individual health through the frequent encounters with the technological devices including computer, cell phone and driers. People tended to remain careful and cautious vis-à-vis the issues that directly affected them (Oztunali- Kayir, 2003; McCallum, 2008). Kollmuss and Agyeman (2002, 255) came up with that affective development might trigger pro-environmental behaviour. Holistic perspective should be added in environmental behavioural change models because of its cognitive and affective connections. There are modelling programmes such as Structural Equation Modelling. The models may be check over by these programmes.

Last but not least, the participants also mentioned 'endemic species', in other words 'biodiversity' (1st and 2nd participants). The United Nations declared 2010 as the year of biological diversity (CBD, 2010a). Biological diversity is also stressed by a motto reading "biological diversity is life itself and the life is biological diversity" (CBD, 2010a). Over all, Turkey holds a special place in terms of efforts over the matter given its rich biological diversity (Cepel, 2008). Under the current conditions, Turkey has

many biodiversity to lose unless proper measures are taken therefore different education programmes should be drafted to pay attention in order to preserve the local biological diversities.

To conclude, human tends to be more interested in issues which directly affect their lives. Indirect impacts also should be evaluated in order to have holistic approach. Biodiversity is affected both direct and indirect impacts very quickly therefore biodiversity should be an important subjects of education programmes (McCallum, 2008). The principle of conservation of biological diversity is adopted at the 1992 Rio Summit; however, its full implementation became possible only in 2010. It is not certain how many species have become extinct during this period and how this process of extinction has affected human life (CBD, 2010b). As the time runs out, it is obvious that a holistic perspective should be developed in order to understand complex relationship between species.

Finally, the complex relationship of ecology might be considered as a quadratic or cubic equations. The values of variables in the equation can change according to the values on the other side of the equation. This means that $n\infty$ combination is possible because ecology is per se a complicated system. When we add human factor this system it becomes more complicated. It is believed that the optimal level of the equations is achieved by compliance with the world convention and respect for the human beings as well as the nature.

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Appendix 1.

Education programme

Date	Time	Name of the event	Place
25.07.2010	12:00-13:00	Opening speech and filling out preliminary surveys	ÇATOML (Çanakkale Vocational High School for Tourism and Hotel Management)
25.07.2010	13:00-14:00	E 25. Introduction and meeting	ÇATOML
25.07.2010	14:00-16:00	E. 1. First aid in emergency cases	ÇATOML
25.07.2010	16:30-18:30	E.2. Producing compost out of domestic waste	ÇATOML
25.07.2010	19:00-22:00	E3.Vertebral animals in Çanakkale and nearby towns-Theory	ÇATOML
26.07.2010	9:00 -12:00 (Theory) 13:00-17:00 (Practice)	E.4. Geological and historical structure of the region Theory and practice	Kalkım Municipality
26.07.2010	18:00-20:00	E.5. Endemic plants in the region Theory	Adatepe
27.07.2010	9:00-12:00	E3.Vertebral animals in the region Practice	Kalkım Municipality
27.07.2010	13:00-19:00	E 7. Rive ecology and its significance (Theory and practice)	Kalkım Municipality
28.07.2010	09:00-12:00	E 9.Troy national park since the prehistoric era	Troy National Park
28.07.2010	13:00-16:00	E 6. Ethnobotanic	Tevfikiye Village-nearby Troy National Park
28.07.2010	16:00-18:00	E 10. Improving national parks by focusing on preservation	Tevfikiye Village-nearby Troy National Park

28.07.2010	18:30-20:00	E 16.Seaweeds and their vital importance Theory and practice	Harmanyeri- Kepez Coast
29.07.2010	08:00-19:00	E 11. Historical importance of the city	Gallipoli Peninsula
29.07.2010	20:30-22:00	E 15. Underwater and sea ecology Theory	ÇATOML
30.07.2010	10:00-15:00	E 17. Scuba-diving event	Bozcaada
30.07.2010	16:00-17:00	E 15. Underwater and sea ecology Practice	Bozcaada
30.07.2010	18:30-19:30	E 13. Ecotourism	Bozcaada
31.07.2010	9:00-12:00	E 22. Climatic features of the region	ÇATOML (Theoretical) Çanakalan Wildfire check point
31.07.2010	13:00-17:00	E 12. Natural and human-made magnetic field and environmental health	Çanakalan Wind Stations
31.07.2010	20:30-23:00	E 20. Astrophysics: are we alone in the universe	Ulupınar Observation House (ÇOMÜ) Çanakkale
01.08.2010	9:00-15:00	E 18. Çan Coal reserves and water resources	Çan
01.08.2010	15:00-19:00	E 19. Drinking water filling facilities Atikhisar Dam-trip	Çanakkale-Çan Highway
01.08.2010	20:00-21:30	E. 24. Ecological footprints; life 100 years ago; life now	ÇATOML
02.08.2010	09:00-11:00	E 21. Role of insects in preserving the nature Theory and practice	ÇATOML (Theory) Dardanos Facilities (Practice)
02.08.2010	11:00-12:00	E 2. Producing compost out of domestic waste	ÇATOML
02.08.2010	13:00-16:00	Deep ecology	ÇATOML

| 02.08.2010 | 20:00-22:00 | Interactive presentation | ÇATOML |
| 03.08.2010 | 09:00-11:00 | Final surveys Evaluation of the project by the participants | ÇATOML |

Appendix 2.

Demographic characteristics of the participants

Participant No	Gender	Age	Profession
1	Female	25	Math teacher (elementary graders)
2	Female	26	Science and tech teacher
3	Male	20	Science and tech teacher
4	Female	31	Landscape teacher (Academic)
7	Male	49	Social science teacher
8	Male	35	Science and tech teacher
9	Male	32	Science and tech teacher
10	Male	37	Social science teacher
11	Male	26	Math teacher (elementary school)
13	Male	33	Primary school teacher
14	Male	24	Science and tech teacher
15	Male	35	Science and tech teacher
16	Female	29	Primary school teacher
18	Female	20	Biology teacher
21	Female	26	Science and tech teacher
22	Female	22	Science and tech teacher
23	Female	44	Biology teacher
24	Female	26	Primary school teacher

Appendix 3.

Last version of the environmental awareness scale

	Totally agree	Agree	Partly agree	Do not agree	Never agree
1. Rapid technological development causes technological pollution.					
2. Cell phones should renewed when a new production launches.					
3. Genetically modified foods threaten human and animal health.					
4. Every house may produce own electric by solar panels at sunny places.					
5. Energy may be produced by ocean waves.					
6. Recycling of papers is a way of protecting forests.					
7. Clothes should be washed by prewashed programme.					
8. Electrical devices should be switched off by on-off button.					
9. Energy saved electrical devices should be used.					
10. Electronic waste may be recycled like papers.					
11. Legally wind station should be compulsory at windy areas.					
12. Biogas may reduce to petrol dependence.					
13. Riding bicycle should be generalized in a city.					
14. Green energy resources should be found.					
15. Building insulation may be achieved by waste straw bundle.					
16. Olive seed may be used as fuel resource.					

The Awareness of Preservice Teachers in Primary School Education Department on Environmental Problems

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Abstract

In the prevention or decreasing of environmental problems, attitudes and awareness of people have been significant. First of all, primary school teachers' awareness and tenderness on this field should be improved. In this study, the awareness of preservice teachers in primary school teaching department on environmental problems is aimed to be declared. This study has been conducted in 2015-2016 semesters. As for research method, in this study, the descriptive model that is a kind of quantitative research method has been preferred. In this sense, 1.,2.,3., and 4. grade university students in 4 different universities in Turkey, totally 742 students, have been determined as the sample of this study. The data of this study has been analyzed via SPSS program and the findings of this study have been presented as related to the aims of this study. As a result of this study, it has been found that the awareness of the students on the environmental problems has been seen as 74 %. Additionally, it has been declared that the students in this study have been answered correctly the questions on "knowledge" step as 69 %; they answered correctly the questions on "comprehension" step as 81%; the questions on "practice" step have been answered correctly for 81 %; on the "analysis" step, there have been 81.5% of the students who have been answered the questions correctly; on the "synthesis" step, there have been 66.6 % of the students who could answer the questions correctly and finally the questions in "evaluation" step have been answered correctly by 73 % of the students.

Keywords: Education Faculty, Environmental problems, Environmental awareness

Introduction

The environment in which people and other species live and interact with each other is a physical, social, economic and cultural setting (Ertekin, 2011). The environment supply the most suitable living conditions for 3.8 billion years as considering the rate and quality of water, suitable temperature, the rate and quality of vegetation cover, natural resources and all of the organisms (Raven, Berg and Hassenzahl, 2012). However, nowadays, environmental problems have been increased and the kinds of those problems have been verified. As for the most significant environmental problems, air, soil and water pollution, acid raining and deformation of ozone could be seen. Because of direct or indirect harming caused by people, both people and other species could be damaged (Farmer, 1997). The environmental problems such as rising soil

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lost, extinctions of some species, desertification and radioactive pollution have threatened people (Akkurt, 2007).

According to Akın (2014), the pollutions of some living materials such as air, soil and water can damage the natural balance and it makes hard the living conditions. The natural environment and ecosystem (Yücel, 2006) that is necessary for all species can be directly affected by environmental pollutions. If the environmental problems go on, ecosystem in which not only people but also other species are living cannot supply sustainable living conditions (Titiz, 1995). Accordingly, the natural resources can be damaged because of environmental problems and in this sense there is not a chance to live for rising population (Yücel, 2006).

Defining and understanding the environmental problems have been important for societies in terms of discussing those problems. In this sense, environmental problems have been nearly related to the ideological setting, interests and socio-cultural elements of societies. Therefore, the perspectives of people on environmental problems have a crucial role for solutions of those problems (Buckingham and Turner, 2008). Individuals, even if their governments are not desire to solve some problems, can be a part of some national or international organizations and they can create awareness for those problems (Harris, 2012).

The most important reason of environmental problems and pollution is human (Daştan, 1999). The effect of human-being on the quality of environment and natural resources has been highly pointed. For this reason, people have an important role for life quality and sustainable development for environment (Sneddon, 2000). The most significant way for living healthy is having environmental awareness. People who have environmental awareness can protect the environment and they can make it better (Baykan, 2004). For this process, the process of informing via education has a crucial role (Erdönmez, 1993). In this sense, education helps people to analyze environmental problems and to have necessary precautions (Chauhan, 2008). Hence, the awareness of primary school teachers who are teaching for primary school students has a crucial role for the solution of environmental problems. The aim of this study is revealing the awareness of preservice teachers in Primary School Teaching Education Department on the environmental problems. As regarding to this main aim, the sub-aims that are given below are aimed to be answered:

Is there any mean difference of the awareness of preservice teachers in Primary School Teaching Education Department on environmental problems as for knowledge level?
Is there any mean difference of the awareness of preservice teachers in Primary School Teaching Education Department on environmental problems as for grades?
Is there any mean difference of the awareness of preservice teachers in Primary School Teaching Education Department on environmental problems as for genders?

Methodology

As for research model, the descriptive model that is a subtitle of quantitative research model was determined as a research model for this study. The main reason of determining this model is that the descriptive model is a research method that helps researchers to describe the events both in the past and now apparently. Another reason of using this model is the chance of examining the existing conditions deeply via this model.

Participants

As considering the aim of this study, four different university that have been different levels in terms of the criteria determined by Higher Education Institution were randomly selected for this study. In those universities, students who have been educating in Primary School Teaching Education Department in Faculty of Education were selected in 2015-2016 autumn semester. The first grade students (n=256), the second grade students (n=176), the third grade students (n=186) and the fourth grade (n=124) students were the sample of this study. As for gender differences, there were female students (n=586) and male students (n=156).

Instruments

In this study, for the aim of determining the awareness of pre-service teachers in Primary School Education Department on environmental problems; the scale namely "The Awareness Scale for Environmental Problems" developed by Güven and Aydoğdu (2012) was used. This scale was composed of 44 items via 3 point Likert scale in order to determine the participation rates of participants. Those 44 items was composed of 6 sub-factors. The sub-factors of this scale were determined as *knowledge* "*4, 6, 9, 23, 32, 35, 41, 43", uptake "2, 11, 13, 16, 20, 25, 33, 40", practice "12, 14, 15, 19, 36, 38", analysis "1, 8, 10, 21, 22, 24, 28, 31", synthesis "5, 17, 18, 27, 39, 42, 44"* and *evaluation "3, 7, 26, 29, 30, 34, 37".* At the end of the factor analysis, total variance of sub-dimensions was determined as 68%. According to the data gathered via this scale, it was seen that reliability for sub-dimension was found as *knowledge .65, uptake .70, practice .62, analysis .68, synthesis .73* and *evaluation .75.* The general reliability score of this scale was found as .72.

Data Analysis

Before the data analysis for sub-problems, normal distribution of data was examined and as a result of the Kolmogorov-Smimov, the data was found as *p>*.05 and it was understood that the data had a normal distribution rate. Since the data had normal distribution, in this study, parametrical tests and analysis method were used. In order to determine the scores for six sub-dimensions of this scale, descriptive analysis was used. For aim of determining the scores of pre-service teachers for each one of the item, frequency and percentage rates were calculated. In order to determine the relationship between sub-dimensions, one-directed variance analysis was used. For gender differences, independent t-test analysis was used.

Findings

Sub-problem: The question asked as "How is the awareness situation of pre-service teachers in Primary School Education Department on environmental problems?" was aimed to be answered. The results of the data analysis which were gathered via "The Scale of Awareness for Environmental Pollution" were given in Table 1.

Table 1.
The Awareness of Pre-service Teachers on Environmental Problems

Level	Item	Yes		No Idea		No		Total	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Knowledge	Biomass energy, hydraulic energy, water and wind energy are renewable energy sources.	627	84,5	65	8,8	50	6,7	742	100
	Waste materials and chemical drugs are rented via microorganisms before they can cause water pollution.	102	13,7	128	17,3	512	69,0		
	The effect of greenhouse occurs via absorption of sun lights thanks to gases which are composed of fossil burning.	477	64,3	226	30,5	39	5,2		
	Sustainable development is the process of sustain natural sources for the new generations.	578	77,9	144	19,4	20	2,7		
	Light pollution prevents astronomy researches that are organized via artificial sky brightness.	422	56,9	261	35,2	59	8,0		
	Transformation means recycling of some materials.	277	37,3	440	59,3	25	3,4		
	Radioactive pollution occurs via radiation of radioactive elements by itself.	201	27,1	337	45,4	204	27,5		
	The depletion of ozone-layer is different in different regions such as south or north hemisphere and equator or poles.	388	52,3	275	37,1	79	10,6		
Uptake	The solution of environmental problems is possible via environmental conscious and environmental education.	712	96,0	23	3,1	7	0,9	742	100
	Air, water and soil are sources that can adapt themselves and they are no consumable.	467	62,9	59	8,0	216	29,1		
	Decreasing of CO2 emission highly prevents greenhouse effect and global warming.	460	62,0	253	34,1	29	3,9		
	Nowadays, especially in big cities, noise pollution is one of the environmental problems and it causes a lot of problems.	669	90,2	46	6,2	27	3,6		
	Ozone-layer also depletes because of photochemical	320	43,1	388	52,3	34	4,6		

	reaction after sun efficiency.							
	For the prevention of environmental problems, environmental effect evaluation is an effective method.	584	78,7	138	18,6	20	2,7	
	There is not a cause and effect relationship between dissertation and global warming..	113	15,2	88	11,9	541	72,9	
	Greenhouse effect is a natural process for prevention of global warm and sustaining living activities in the world.	223	30,1	211	28,4	308	41,5	
Practice	Noise pollution can be prevented thanks to afforestation, sound absorbers and mass transits.	442	59,6	105	14,2	195	26,3	742 100
	The use of natural gases and preference of mass transits highly reduces the air pollution.	606	81,7	78	10,5	57	7,7	
	People can live and adapted in polluted areas thanks to their high adaptation ability.	198	26,7	146	19,7	398	53,6	
	Some precautions for water pollution are decreasing waste materials and having more distillation units.	616	83,0	93	12,5	33	4,4	
	Appropriate farming for soil and using sets can be effective for preventing erosion.	620	83,6	86	11,6	36	4,9	
	Environmental problems need changing habits of people for consuming.	576	77,6	127	17,1	39	5,3	
Analysis	In this era, air pollution can cause a lot of serious problems such as greenhouse effect, global warming, climate changing and depletion of ozone-layer.	724	97,6	15	2,0	3	0,4	742 100
	The most important reason of air pollution is the use of fossil fuel and exhaust gases.	618	83,3	76	10,2	48	6,5	
	Some of the environmental problems in those days have been caused by earthquake, flood and volcanic explosion.	312	42,0	156	21,0	274	36,9	
	The reason of radioactive pollution is nuclear weapons and reactions.	552	74,4	147	19,8	43	5,8	
	Global environmental	608	81,9	119	16,0	15	2,0	

	problems are the basic reasons for the extinction of some species.							
	Nowadays, dissertation, soil pollution and partial farming have caused scarcity of food in many countries.	663	89,4	65	8,8	14	1,9	
	The most significant reason of depleting in ozone-layer is chlorofluorocarbon gases.	255	34,4	450	60,6	37	5,0	
	Water pollution causes some changes in species, decreasing bio-equality eutrophication.	570	76,8	141	19,0	31	4,2	
Synthesis	Environmental problems have been seen since the beginning of the world and ecological balance can solve those problems every time thanks to its natural ability.	256	34,5	170	22,9	316	42,6	742 100
	In order to prevent acidic rains, fossil fuel that consists of alkaline materials should be used.	176	23,7	391	52,7	175	23,6	
	Solid wastes are effaced by microorganisms in soil and those do not cause pollution.	129	17,4	160	21,6	453	61,1	
	Environmental problems are boundless and global.	606	81,7	85	11,5	51	6,9	
	The different ways of lighting for big cities and skyscrapers is a sign for development.	248	33,4	119	16,0	375	50,5	
	Global warming, greenhouse effect, climate change and depleting of ozone-layer are natural events that are related to geological time and those are not related to environmental problems.	211	28,4	135	18,2	396	53,4	
	Environmental problems that occurs in which country should be solved by this country.	164	22,1	60	8,1	518	69,8	
Evaluation	Since noise is not an objective term, it is not named as a pollution type.	70	9,4	82	11,1	590	79,5	
	For preventing environmental problems, afford of just one country is not enough and all of the world should afford to solve the problems.	695	93,7	29	3,9	18	2,4	742 100
	Unconsciousness, insensitivity and philistinism of	680	91,6	42	5,7	20	2,7	

people can cause big environmental problems.					
In touristic areas, there is no pollution because of natural features.	120	16,2	99	13,3	523	70,5
Since global warming can help people's warming necessities, it should be supported for people.	139	18,7	80	10,8	523	70,5
An acidic rain is seen just in the areas in which factories and institutions are highly seen.	236	31,8	212	28,6	294	39,6
The environmental problems in these days have been occurred as a result of our era.	462	62,2	111	15,0	169	22,8

When the analysis results which were given in Table 1 were examined, and also pre-service teachers cognitive abilities for environmental problems were discussed; it was seen that 84.5% of pre-service teachers stated the correctness of the item "Biomass energy, hydraulic energy, water and wind energy are renewable energy sources." that was given in "*knowledge*" step. However, 59.3% of those teachers stated that they did not have any idea about the item "Transformation means recycling of some materials.". 77.9% of the pre-service teachers stated the correctness of the item "Sustainable development is the process of sustain natural sources for the new generations.". When the general results of "knowledge" step were analyzed, it was seen that 69% of the pre-service teachers correctly answered the questions given in this step.

When the analysis results which were given in "uptake" step were examined, it was seen that 96% of pre-service teachers stated the correctness of the item "The solution of environmental problems is possible via environmental conscious and environmental education." that was given in this step. However, 62.9% of those teachers stated that the item "Air, water and soil are sources that can adapt themselves and they are no consumable." was correct. The water problems in many countries are ignored by the pre-service teachers, because they answered this question as "yes". 30.1% of the pre-service teachers answered "yes" for the item "Greenhouse effect is a natural process for prevention of global warm and sustaining living activities in the world." even if it was wrong. When the general results of "uptake" step were analyzed, it was seen that 73% of the pre-service teachers correctly answered the questions in this step.

When the analysis results which were given in Table 1 were examined, it was seen that 83.6% of pre-service teachers stated the correctness of the item "Appropriate farming for soil and using sets can be effective for preventing erosion." that was given in "*practice*" step. However, 53.6% of those teachers answered "no" for the item "People can live and adapted in polluted areas thanks to their high adaptation ability.", yet 26.7% of those teachers answered "yes" for this item. When the general results of "practice" step were analyzed, it was seen that 81% of the pre-service teachers correctly answered the questions in this step.

When the analysis results which were given in "analysis" step were examined, it was seen that 97.6% of pre-service teachers answered "yes" for the item "In this era, air pollution can cause a lot of serious problems such as greenhouse effect, global warming, climate changing and depletion of ozone-layer.". However, 42% of those
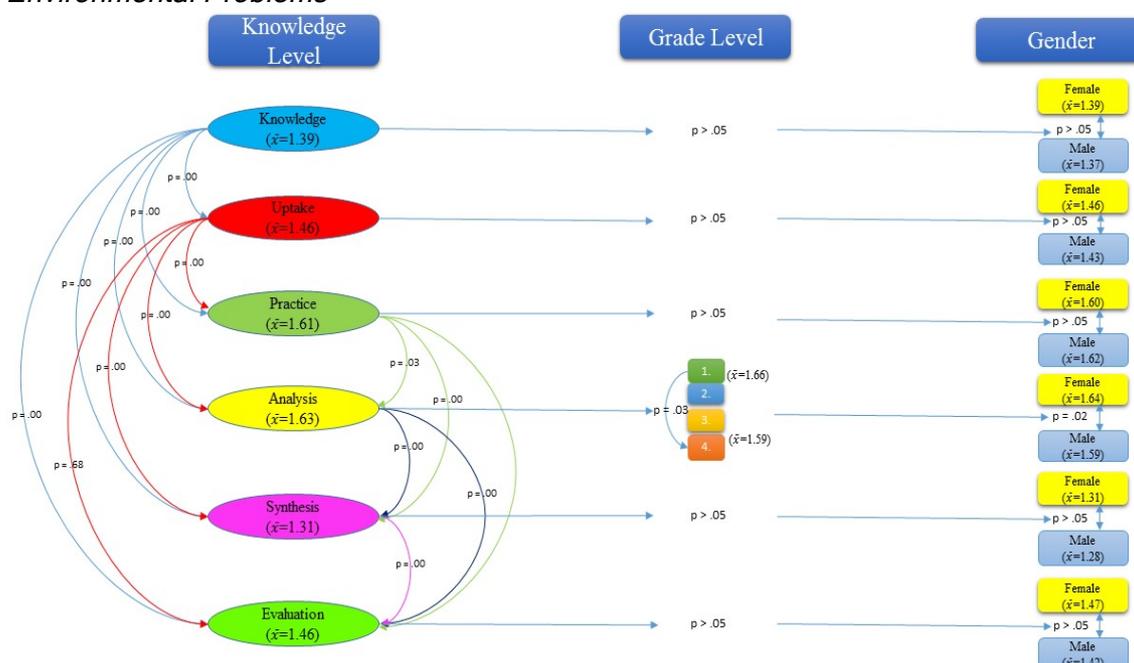
teachers answered "yes" for the item "Some of the environmental problems in those days have been caused by earthquake, flood and volcanic explosion." and 36.9% of those teachers answered "no" for the same item. 60.6% of the pre-service teachers stated that they did not have any idea about the item "The most significant reason of depleting in ozone-layer is chlorofluorocarbon gases." When the general results of "analysis" step were analyzed, it was seen that 81.5% of the pre-service teachers correctly answered the questions in this step.

When the analysis results which were given in "synthesis" step were examined, it was seen that 34.5% of pre-service teachers stated the correctness of the item "Environmental problems have been seen since the beginning of the world and ecological balance can solve those problems every time thanks to its natural ability." even if it was wrong; and 42.6% of the participants answered "no" for the same item. However, 52.7% of those teachers stated that they did not have any idea about the item "In order to prevent acidic rains, fossil fuel that consists of alkaline materials should be used.". 81.7% of the pre-service teachers stated the correctness of the item "Environmental problems are boundless and global.". When the general results of "synthesis" step were analyzed, it was seen that 66.6% of the pre-service teachers correctly answered the questions in this step.

In table 1, when the analysis results which were given in "*evaluation*" step, it was seen that 93.7% of pre-service teachers stated the correctness of the item "For preventing environmental problems, afford of just one country is not enough and all of the world should afford to solve the problems." that was given in "*evaluation"* step. However, 31.8% of those teachers answered "yes" for the item "Acidic rains is seen just in the areas in which factories and institutions are highly seen.", and 39.6% of them said "no" for the same item. It was observed that pre-service teachers had no idea about acidic rains. 70.5% of the participants stated the incorrectness of the item "In touristic areas, there is no pollution because of natural features.", however, 16.2% of them stated the correctness of that item. When the general results of "*evaluation*" step were analyzed, it was seen that 73% of the pre-service teachers correctly answered the questions in this step. The total results for the correct answers of the participants were observed as 74%.

Sub- problem: The question asked as "Is there any mean difference between the knowledge, grade and gender of pre-service teachers in Primary School Education Department on the awareness of environmental problems?" was aimed to be answered. The data gathered from the participants were analyzed and the results were given in Figure 1.

Figure 1.
The Differences of gender, grade and knowledge of Pre-service Teachers on the Environmental Problems

When the analysis given in Figure 1 was examined, it was seen that there was mean difference between knowledge and other dimensions. Additionally, although a mean relationship between all categories and sub-categories were found, there was no mean difference between "practice" step and "evaluation" step. As for the result of Dunnett C test that is a kind of Post Hoc test which is used to determine the reason of mean differences, the awareness rates of the pre-service teachers were seen mostly in analysis step ($\overline{x} = 1.63$) and then it was seen in practice step ($\overline{x} = 1.61$). the awareness rate of the pre-service teachers on environmental problems was higher seen in analysis step than the other steps. When the results were examined, it was seen that the results were firstly in support of analysis step and secondly it was seen in support of practice step.

As for grade differences, it was seen that there was a mean difference just for analysis step on the first and fourth grade pre-service teachers. That difference was in support of first grade teachers. There was no mean difference between the other steps such as knowledge, uptake, practice and the grade of the participants. This result showed that there was no development on the awareness of the pre-service teachers on environmental problems when they are going on their education in higher grades. For this reason, there was no mean difference between the grades and awareness of the pre-service teachers.

As for gender differences, the mean difference between male and female participants was seen in just analysis step. This difference was in support of female participants. There was no mean difference between other steps and gender. Therefore, in general, it was found that there was not a mean difference between gender and awareness of the pre-service teachers on environmental problems.

Conclusion and Discussion

At the end of this study, it was seen that 74% of pre-service teachers were aware of environmental problems. Hence, it can be said that the awareness of pre-service teachers on this field was a satisfied level. When the other studies in literature were reviewed, it was seen that the awareness of pre-service teachers in this study were better than the others in other studies. For instance, in a study conducted by Oğuz, Çakçı and Kavas (2010), even if students had a course on environmental issues, their awareness on this field was lower than the expectations. In another study in which the awareness of pre-service teachers in Primary School Education Department on global warming that was conducted by Kahraman, Yalçın, Özkan and Aggül (2008), it was stated that pre-service teachers has a low awareness level on this issue. In another study conducted by Güven and Aydoğdu (2011), it was found that pre-service teachers in Science Education Department were lowly aware of environmental problems. Similarly, Özdemir, Yıldız, Ocaktan and Sarışen (2004) found that students in Medical Faculty had a low level of awareness for environmental problems.

In this study, it was determined that 69% of pre-service teachers correctly answered the items in "knowledge" step, 81% of them correctly answered the items in "uptake" step; 81% of them correctly answered the items in "practice" step, 81.5% of them correctly answered the items in "analysis" step; 66.6% of them correctly answered the items in "synthesis" step and 73% of them correctly answered the items in "evaluation" step. Hence, it was seen that pre-service teachers had the lowest scores in knowledge and synthesis steps. Those findings were similar the results of other studies in literature. For instance, Yener and Kalıpçı (2007) stated that the knowledge of pre-service teachers on environmental problems was not scientific and they did not have enough knowledge on this issue. Şahin, Ünlü and Ünlü (2016), however, stated that there was a mean difference between grades and awareness of pre-service teachers on environmental problems. Öztaş and Kalıpçı (2009) stated that pre-service teacher in Science Education Department, Biology Education and Chemistry Teaching Department had not enough knowledge on environmental pollution and environmental problems in urban. Güven and Aydoğdu (2011) found that the knowledge level of pre-service teachers in Science Education Department was in a low degree. Bahara (2000) stated that university students had no idea on ozone-layer depletion and greenhouse effect or they had wrong knowledge on these issues. Yılmaz, Morgil, Aktuğ and Göbekli (2002) stated that students in high schools or in higher education had not enough information about environmental issues, they could not learn those issues adequately and they did not know environmental problems. The result on lack of knowledge on environmental problems was similar to the results in international studies. Azapagic, Perdan and Shallcross (2005) found that university students had not enough information about environmental problems.

When the literature was reviewed, it was seen that not only students in higher education but also students in other schools were not aware of environmental problems. For instance, Demirbaş and Pektaş (2009) found that primary school students had not enough information on environmental problems. Additionally, Sadık, Çakan and Artut (2009) stated that the awareness of primary school students on ozone-layer depletion, soil or light pollution and global warming was in a low level. When the international studies were examined, it was seen that there were different results for different schools. According to some findings, the awareness on environmental problems was in a high level, but in some others, that rate was in a low level. When the studies in which low rate of awareness was found, Said et. al. (2002) found that just 10% of secondary school students had knowledge on environmental

issues and they just had knowledge on environmental problems like pollution. Larijani (2010) stated that secondary school student had knowledge on medium level. However, in some studies, it was stated that the awareness of students on environmental problems was in a high level. For instance, Elm (2006) stated that preschool students were aware of environmental problems and they could recognize some environmental dangers. Wong (2010) found that university students in China had a high level of awareness on environmental problems. Shobeiri, Omidvar and Prahallada (2007) stated that high school students in Persia and India had a high level of awareness on environmental issues. Page (2000) discovered that 4-5-year-old children in Australia were aware of environmental problems.

The awareness of pre-service teachers on environment pollution was found as higher rate in analysis step. When the findings were examined, it was seen that the awareness rate was mostly in analysis step and then in practice step. As for analysis step, it was found that 1. and 4. Grade students had higher scores. In literature, there were some studies which stated that environmental awareness was getting higher in old ages. For instances, Aminrad, Zakaria and Hadi (2011) stated that in old ages, environmental awareness was higher. In this study, it was found that there was no gender difference between pre-service teachers on environmental problems. However, in analysis step, it was seen that there was a mean difference in support of female participants. In literature, it was seen that there were some studies which stated a gender difference in support of female participants, however in some studies, it was stated that there was no mean difference between gender and the awareness of environmental problems. For instance, in some studies conducted by Shahnawaj (1990), Gardos & Dodd (1995), Rou, Sabhlok (1995), Patel (1995), Szagun and Pavlov (1995), Davidson & Freudenburg (1996) and Tripathi (2000), it was stated that gender was an effective parameter. Özden (2008) stated that female pre-service teachers were more aware of environmental problems. Özdemir (2003) stated that 8.grade female students were more aware of environmental issues than male students. Larijani (2010) found that secondary school female teachers were more aware of environmental issues. In a study conducted by Yenice, Saracaloğlu and Karacaoğlu (2008), it was seen that there was no mean difference between age, gender and environmental issues of pre-service teachers in Primary School Education Department in terms of having a course on environmental issues. Shobeiri, Omidvar and Prahallada (2007), similarly, stated that gender was not a mean parameter for the awareness of environmental problems. Additionally, it was seen that there was a changing situation for teachers in terms of their working regions. For instance, Rou (1995) and Dinakara (2000) stated that teachers in urban were more aware of environmental issues and the others working in rural regions.

On the other hand, it was observed that pre-service teachers' awareness rates were higher in "*practice*" and "*analysis*" steps. This result showed that pre-service teachers were aware of negative effects of environmental pollution and they were aware of the reasons of environmental problems. This finding can be seen as significant in terms of the awareness of environmental problems. In this sense, some studies in literature stated that attitudes and knowledge on environment may not be turned on actions (Erten, 2005). In a similar study in literature, Hausbeck, Milbrath and Enright (2010) found that even if the knowledge of 11.grade students on environmental issues was in a low level, they had high scores on the awareness and concern on this field.

As considering the findings on the awareness of pre-service teachers in Primary School Education Department on environmental problems, the suggestions given below were stated:

- For the aim of increasing the awareness of pre-service teachers, informative courses and activities should be organized.
- Some activities which will be helpful for pre-service teachers in Primary School Education Department on increasing their awareness for synthesis and evaluation steps should be conducted.

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