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Environmental Education at Faculty of Agriculture and Changing Awareness, Attitude and Behavior towards Environment in Turkey

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ABSTRACT

Environmental problems have become increasingly more destructive. For this reason, environmental education and awareness have gained importance. This study had two objectives: to determine the factors affecting the attitude and behavior of Faculty of Agriculture students towards the environment and to test if the education given creates a significant difference in students' environmental attitude and behavior. The study was conducted on 160 first and fourth year students at Gaziosmanpasa University, Faculty of Agriculture, during 2016. Data were collected using a face-to-face questionnaire which collected data for 'Environmental Awareness and Attitude Scale' consisting of 21 elements and 'Environmental Behavior Scale' consisting of 24 elements. Factors affecting the attitudes and behaviors were determined separately by Exploratory Factor Analysis (EFA). Kruskal-Wallis test was conducted to determine if there was a significant difference in attitudes and behaviors of the first and fourth year students. Based on Kruskal Wallis test results, significant difference was found between the first and the fourth year students for "Environmental destruction" (P< 0.01) and "Environmental responsibility" (P< 0.05) factors. In other words, environmental courses taken by students throughout their four study years in the school created an awareness and changes in their attitudes. In addition, "Environmental education" (P< 0.01) and "Environmental protection" (P< 0.01) factors were significantly different in the first and fourth year students. The present study showed that it is possible to train agricultural engineers with high levels of environmental awareness and sensitivity using a well-planned four-year education program supported with an efficient environmental education.

Keywords: Environmental destruction, Environmental protection, Factor analysis, Kruskal-Wallis test.

INTRODUCTION

Presently, the world is experiencing many environmental problems, which are the results of exploitation of natural resources. The primary cause of environmental degradation is human disturbance (Choudhary *et al.*, 2015). Environmentally conscious individuals will be more effective than laws in protecting the environment. A person's strong consciousness about natural resources is positively associated with his/her attitude and behaviors (Paco and Raposo, 2009; Straughan and Roberts, 1999). Therefore, the concepts of consciousness and sensitivity for the environment which seeks to change human behavior are critical in the solution of environmental problems. Since agricultural activities are closely associated with environment and its pollution, it is important

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that agriculture specialists who carry out agricultural activities are made conscious about the environment (Thrall *et al.*, 2010).

It is particularly important to raise environmental awareness among young people. Changes in people's environmental behavior can be achieved through education. Young people's environmental attitudes are particularly important because they will ultimately be affected and need to provide solutions to environmental problems arising from present-day actions (Cotton, *et al*., 2007; Olsson *et al*., 2015; Michalos *et al*., 2012). As future scientists, policymakers, consumers, and voters, today's youth will be responsible for 'fixing' the environment, and they will be the ones who must be persuaded to adopt and pay the costs of future environmental policies (Ferrer-Balas *et al*., 2010; Jones *et al*., 2010). Therefore, it appears that effective environmental education for school-age students is crucial. In general, young people's attitudes towards the environment begin to develop at a very early age (Ernst and Theimer, 2011; Gifford and Sussman, 2012).

The perception of environmental problems by young people is of great importance for two reasons: first, in the near future they will have a great influence on running of business and, second, knowing what they think about environmental issues will help to establish better pro-environmental education among them (Pawlowski, 1996). Many countries have been seriously reconsidering the role of their young people in managing their environment, and their rights and responsibilities in shaping their future and their societies. Indeed, it has been considered that young people can play a major and permanent role in sustainable development (Hart, 2008). Bringing the environment to spotlights and highlighting how young people could solve present environmental problems are critical to deal with pessimism and "action paralysis" currently experienced by many young people (Fielding and Head, 2012).

For centuries, education has been considered as a priority for human beings. Education is a ground for introducing skills, knowledge, awareness and understanding to lead a successful life in the world. For this success, humankind must use environmental education. It is a crucial experience which can change the lifestyle of society members, because by using these principles people can have positive participation in environment. These educational principles create a new behavioral model among people, groups and societies regarding the environment. In this respect, (Larkin *et al*. 2005) suggested that all people should know their environment and by admiring other regions, they should preserve and appreciate their own environment (Shahram *et al.*, 2014).

Environmental education increases knowledge about environment and the required skills for its preservation. Environmental education relies on several factors including public awareness and concern and critical thinking for environmental problems. It is an interdisciplinary field consisting of awareness about environment and its value, approach to environmental problems and functionality (skill acquisition for problem solving) (Jowkar and Mirdamadi, 2010).

The focus of environmental education programs has often been modified to ensure positive attitudes towards the environment by increasing knowledge on it (Pooley and O'connor, 2000). But, the basic ecological knowledge within the context of environmental education is not always enough to create environmental awareness and behavior (Kuhlemeier, Van Den Bergh, Lagerweij, 1999; Pooley and O'Connor, 2000). Environmental education is not just an information concept; it is also a concept of values, attitudes, and actions related to ethics (Davis, 1998).

Although there is no specific curriculum for environmental education in Turkish formal education system, basic information related to the environment is provided under different courses in primary and secondary schools. Similarly, there is not a specific environmental education policy adopted or applied nationally with regard to higher

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education. Course contents are decided by universities. Therefore, there is not a standard environmental education infrastructure or application at higher education level (Oğuz *et al.*, 2011). But higher education institutions are responsible for educating individuals to improve the overall life quality and environmental protection (Corcoran and Wals, 2004).

Studies related to environmental education at elementary, intermediate and high school levels in Turkey have increased in recent years. In addition, some studies have questioned effectiveness of environmental education in some universities. Their results are important to demonstrate shortcomings of environmental education at university level. Acquired information isn't always transformed into lifestyle of students. Many factors such as socio-cultural conditions, laws, economic considerations, education, and sensitivity affect this transformation.

A research conducted by Çabuk and Karacaoğlu (2003) on the status of environmental awareness at higher education level in Turkey aimed to identify the ideas of Faculty of Educational Sciences students at Ankara University about environmental sensitivity. According to students' opinions, formal education was not sufficient about air, water, and soil pollution. The study also found differences among students for the level of environmental awareness.

Oğuz *et al*. (2011) studied environmental awareness and sensitivity levels of undergraduate students in Departments of Landscape Architecture, Environmental Engineering and Town and Regional Planning. Research findings showed that the environmental awareness and sensitivity levels were independent of students' school years. Although the students had basic knowledge on environmental problems and protection of natural resources, they did not develop sufficient environmentally responsible attitudes and behaviors. The authors pointed the need for revision of environmental education courses in abovementioned disciplines in order to provide students with environmentally responsible attitudes and behaviors. They also indicated the need for national strategies and policies on environmental education in higher education.

A study on university students attempted to develop a scale to measure environmental awareness of students (Başal *et al.*, 2015). It was determined that there was a significant difference in favor of students who took a course related to environmental education. Yeşilyurt *et al*. (2013) aimed to develop an environmental awareness and sensibility scale for measuring environmental awareness of teacher candidates. For this aim, a total of 93 scale items were prepared by reviewing the relevant literature. Based on exploratory factor analysis, two factors were identified and Cronbach Alpha internal consistency coefficient for the whole test was found to be 0.921 (Yeşilyurt *et al.*, 2013).

Environmental education of agriculture students is crucial in developing an understanding of concepts that underpin environmental issues. The strengthening of the environmental awareness of agriculture students will provide important support for agricultural sustainability, because climate change, water shortage, and other environmental problems put pressure on agricultural sector and food security. The most important factor in agricultural sector, as in most others, is environmentally-aware individuals.

These studies are important to guide the environmental education given to agricultural engineers who will direct the future agriculture in Turkey. Educating environmentally conscious agricultural engineers who are aware of environmental problems is a necessity for the sustainability of the country's agriculture and food security. Studies on education, awareness and behaviors of students in other areas of higher education are frequently encountered in literature. However, to the best of our knowledge, there has been no study on environmental awareness of students of

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agricultural sciences in Turkey. The present study will serve to fill this research gap.

Agriculture faculties have courses about agriculture and environment. In the present study, we aimed to investigate the effects of courses about agriculture and environment taught at Faculty of Agriculture on environmental awareness, attitude, and behavior of students. The present study had two aims: (a) To determine the factors affecting awareness, attitudes and behaviors of university students towards the environment, and (b) To test whether environmental education has a role in development of environmental awareness and changing the behavior of agriculture students.

MATERIALS AND METHODS

Data of the study was obtained via a face-to-face questionnaire conducted on the first and fourth year students of Faculty of Agriculture at Gaziosmanpaşa University, in 2016. Thus, the aim was to reveal the effects of courses given during the four years of education at Faculty of Agriculture. Inclusion of the first and fourth year students of only Gasiosmanpaşa University Faculty of Agriculture is the major limitation of the present study. Total number of students at the first and fourth classes of Faculty of Agriculture in 2016 was 277 (Table 1). Based on total student number, a sample size of 160 was calculated using acceptable sample size tables for some populations prepared by Sekaran (2003).

In the study, the questionnaire was prepared to collect data about social and demographic features of students as well as about their environmental awareness, attitudes, and behaviors. The questionnaire included two scales: (a) "Environmental Consciousness and Attitude Scale" consisting of 21 elements, and (b) "Environmental Behavior Scale" consisting of 24 elements. Both scales were five-point Likert type with options "strongly disagree", "disagree", "neither agree nor disagree", "agree" and "strongly agree''. The EFA, a method to explain latent factors, was applied to the data. Two main purposes of the EFA were to reduce number of variables and to reveal some new structures using relationships among variables (Erdoğan, 2003; Netemeyer *et al.*, 2003). The first step in EFA was to test the adequacy of sample size using Kaiser-Meyer-Olkin (KMO) and Barlett tests (Hair *et al*., 2006; Tabachnick and Fidell, 2001). The EFA can be made when *KMO* value is greater than 0.50 and probability of Barlett test is less than 0.05 (Büyüköztürk, 2009; Durmuş *et al.*, 2011).

In addition, Chronbach Alpha coefficient was calculated by applying reliability analysis on designated factors. Then, factors were examined using Kolmogorov-Smirnov test to determine whether they had normal distribution. Kruskal Wallis test, as a non-parametric method, was used to test the significance of difference between two groups. SPSS statistics software (Ver. 22.0) was used for all these applications.

RESULTS

Of 160 students participating in the study, 37.5% were first year and 62.5% were fourth year students. Their average age was 22.18 and average household size was 4.71. Fifty per cent of the participants were female and

Table 1. Number of students in the first and fourth years of different departments at Faculty of Agriculture, Gaziosmanpaşa University.

Department	First year	Fourth year	Total
Agricultural Economics	36	43	79
Plant Protection	16	47	63
Horticulture	16	38	54
Field Crops	37	44	81
Total	105	172	277

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50% were male students. Each of the four departments was represented by 40 students. In terms of the education of parents, 58.75% of the participants' mothers were primary school graduates and only 3.12% of them were college graduates. Seventy per cent of the mothers were housewives while 24% were public servants and 6% were retirees. Fathers of the participants were predominantly high school graduates (62.50%), while 22% of them were college graduates. The most common profession of fathers was public service (40%), followed by retirees (23%), farmers (14%), self-employment (15%) and teachers (8%). Most of the students were coming from low-income households (Table2).

Fifteen per cent of the families had less than 800 TL monthly income, 55% between 800 and 1,500 TL, 16.25% between 1,501 and 3,500 TL, 7.50% between 3,501 and 5,000 TL and 6.25% above 5,000 TL. The students mentioned radio and television (50%), family (18.75%), newspaper and magazines (15.00%), friends (11.25%), and environmental institutions in which they were a member (5%) as the source of their information about the environment.

In terms of the adequacy of the courses offered to students in their college education, 17.50% of the students thought that they benefited much from the courses offered, 53.12% of them thought that they became relatively informed, and 29.38% of them thought that the courses were insufficient. About 33.75% of the students took their courses as mandatory and 66.25% took as elective courses. Only 12% of the students chose the course because of their interest in environment. Of the rest, 48% chose the course due to short duration of the course, 13% because of its ease, and 27% because of other reasons.

The EFA was carried out to determine the awareness, attitude, and behavior of Faculty of Agriculture students towards the environment. Awareness and Attitude Scale with 21 items and Environmental Behavior Scale with 24 items were used. The EFA was applied separately for these scales by testing sample adequacy. KMO and Barlett's tests were used to determine the adequacy of sample size in the EFA.

Table 2. Socio-economic features of students participating in the questionnaire study.

Year	Frequency	%
Fourth year	100	62.50
First year	60	37.50
Gender		
Female	80	50
Male	80	50
Education level of mother		
Unschooled	30	18.75
Primary – Secondary school	94	58.75
High school	31	19.38
College	5	3.12
Working status of mother		
Employed	24	15
Unemployed	136	85
Occupation of mother		
Retiree	11	6.88
Housewife	125	78.12
Civil servant	24	15.00
Education level of father		
Unschooled	6	3.78
Primary – Secondary school	3	1.83
High school	100	62.50
College	35	21.89
Master-PhD.	16	10.00
Occupation of father		
Retiree	37	23.13
Farmer	22	13.75
Civil servant	63	39.38
Self-employed	24	15.00
Teacher	14	8.75
Monthly household income (1$= 3 Turkish Liras (TL) in the year 2016)		
< 800	24	15.00
800-1500	88	55.00
1501-3500	26	16.25
3501-5000	12	7.50
➢ 5000	10	6.25
Average household size	4.71	

The results of awareness and attitudes scale showed that the KMO measure of sampling adequacy was 0.642 and Bartlett's test of sphericity was 451.119 ($P< 0.01$), indicating the adequacy of the sample size

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for the EFA. The results of behavioral scale showed that the KMO measure of sampling adequacy was 0.718 and Bartlett's test of sphericity was 926.96 (P< 0.01), meaning that sample size was adequate for the EFA (Table 3). Awareness, attitude, and behavior items were entered into the Principal Component Analysis (PCA), and primary factors were extracted. In the next step, items showing communality score of less than 0.50 were eliminated and an EFA was performed again using the remaining items. Based on the PCA with varimax rotation, a four-factor solution with eigenvalues greater than 1.0 was obtained as the best fit model for sample. Dimensions with factor loadings that were equal to or greater than 0.30 were retained.

As a result of the EFA, four factors and eleven items were determined. Eventually, this 11-item structure explained 71.04% of the variance for the relationships among the items. The order of the factors was in accordance with the highest eigenvalues and amount of variance explained by each factor (Table 4). These four factors were

Table 3. KMO and Bartlett's Tests of sphericity approx. *Chi*-square.

KMO measure of sampling adequacy for attitudinal variables	0.642
Bartlett's test of sphericity approx. *Chi*-square	451.12 (P< 0.01)
KMO measure of sampling adequacy for behavioral variables	0.718
Bartlett's test of sphericity approx. *Chi*-square	926.96 (P< 0.01)

Table 4. The results EFA for environmental awareness and attitudes.[a]

Factors and Variable	Factor loading	Eigen values	Variance explained (71.040%)	Cronbach's Alpha
Environmental destruction				
Vegetation is destroyed unconsciously and forests disappear.	0.813			
Irrational use of fertilizers and pesticides threatens environment and human health.	0.791	24.76	22.774	0.781
Wetlands and water resources disappear, and waters get contaminated.	0.756			
Agricultural areas disappear due to misuse.	0.741			
Environmental threats				
Radioactive contamination is another threat for environment.	0.825			
Genetically Modified Organisms (GMOs) are dangerous for natural balance and human health.	0.809	18,99	18.986	0.688
Countries exercising nuclear tests should be condemned.	0.706			
Environmental responsibility				
Families have an important responsibility for socializing the children towards consciousness for the environment.	0.875	15.04	14.900	0.701
Newspapers, magazines and television should have more programs about environment.	0.865			
Environmental perspective				
Environmental protection concept was formed by western countries to prevent the developing countries from progressing.	0.853	12.24	14.380	0.642
Air, water and soil are inexhaustible resources.	0.821			

[a] Extraction method: PCA, Rotation method: Varimax with Kaiser Normalization. Rotation converged in 5 iterations.

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"Environmental destruction", "Environmental threats", "Environmental responsibility" and "Environmental perspective". "Environmental destruction" explained 22.77% of the variance, while "Environmental threats" explained 18.98%, "Environmental responsibility" 14.90%, and "Environmental perspective" 14.38%, with Cronbach's Alpha coefficients of 0.781, 0.688, 0.701, and 0.642, respectively (see Table 4).

A total of four factors and 11 items were studied (Figure 1). "Environmental destruction" factor had four items; viz. 'Vegetation is destroyed unconsciously and forests disappear', 'Irrational use of fertilizers and pesticides threatens environment and human health', 'Wetlands and water resources disappear, and waters get contaminated', and 'Agricultural areas disappear due to misuse' with loading levels of 0.813, 0.791, 0.756, and 0.741, respectively (Table 4).

"Environmental threats" factor consisted of three items: 'Radioactive contamination is another threat for environment' (with loading level of 0.825), 'GMOs are dangerous for natural balance and human health' (0.809), and 'Countries exercising nuclear tests should be condemned' (0.706).

"Environmental responsibility" factor had two sub-components: 'Families have an important responsibility for socializing the children towards consciousness for the environment' (0.875), and 'Newspapers, magazines and television should have more programs about environment' (0.865).

"Environmental perspective" factor had two sub-components including 'Environmental protection concept was formed by western countries to prevent the developing countries from progressing' (0.853) and 'Air, water, and soil are inexhaustible resources' (0.821) .

The EFA performed to determine environmental behaviors identified a five-factor and 16-item structure. This 16-item structure explained 68.297 % of the variance for relationships among the items. The order of the factors was in accordance with the highest eigenvalues and amount of variance explained by each one of them (Table 5).

These five factors were "Recycling", "Participation", "Environmental protection", "Environmental education", and "Saving". Percentages explained by each factor were 19.32% ("Recycling"), 15.73% ("Participation"), 12.24% ("Environmental protection"), 10.56% ("Environmental education") and 10.44% ("Saving"), with Cronbach's Alpha coefficients of, respectively, 0.823, 0.759, 0.692, 0.730, and 0.748 (Table 5).

In the present study, five factors and 16 items were determined to affect environmental behavior (Figure 2).

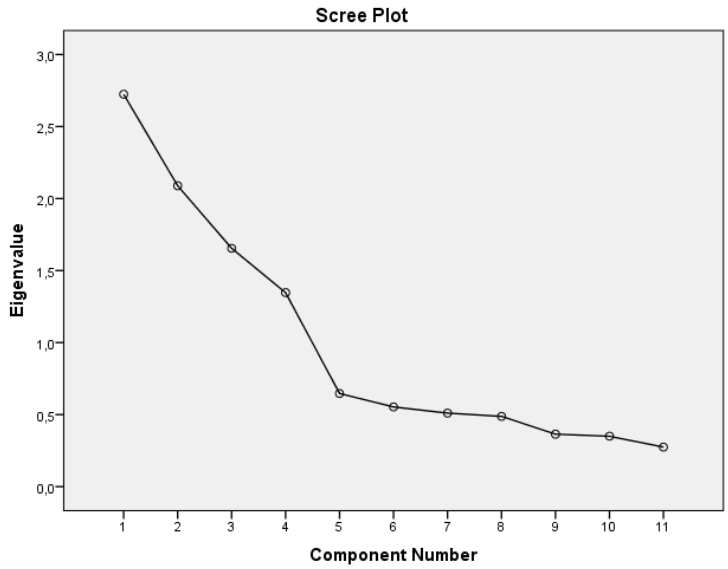

Figure 1. Scree plot for four factors and 11 items

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Table 5. The results of EFA for environmental behavior. [a]

Factors and Variable	Factor loading	Eigen values	Variance explained (68.297%)	Cronbach's Alpha
Recycling				
I use both sides of papers at home and office and put them in recycling bin.	0.790			
It is possible to decrease domestic waste and make them productive. For example, I save and reuse glass, plastic and paper packages.	0.788			
I skimp on use of paper napkin etc. under every conditions.	0.727	27.15	19.324	0.823
I prefer recyclable environment friendly packages.	0.694			
I try to consume organic products since they do no harm to environment.	0.672			
Participation				
I follow programs related to environment on radio and TV.	0.771			
I participate in official organizations on environment and nature protection.	0.770	15.98	15.739	0.759
I participate in afforestation activities.	0.765			
I participate in environmental debates.	0.729			
Environmental protection				
I prefer public transportation though I have a personal vehicle.	0.846			
I collect used batteries, separate them from others and take them to collecting points.	0.730	9.92	12.239	0.692
I avoid using products causing ozone depletion.	0.574			
Environmental education				
I took education on environment.	0.871	8.43	10.554	0.730
I took sufficient education on environmental pollution.	0.851			
Saving				
I act carefully not to waste water.	0.879	6.80	10.441	0.748
I use energy saving devices and machines.	0.786			

[a] Extraction Method: PCA, Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 5 iterations.

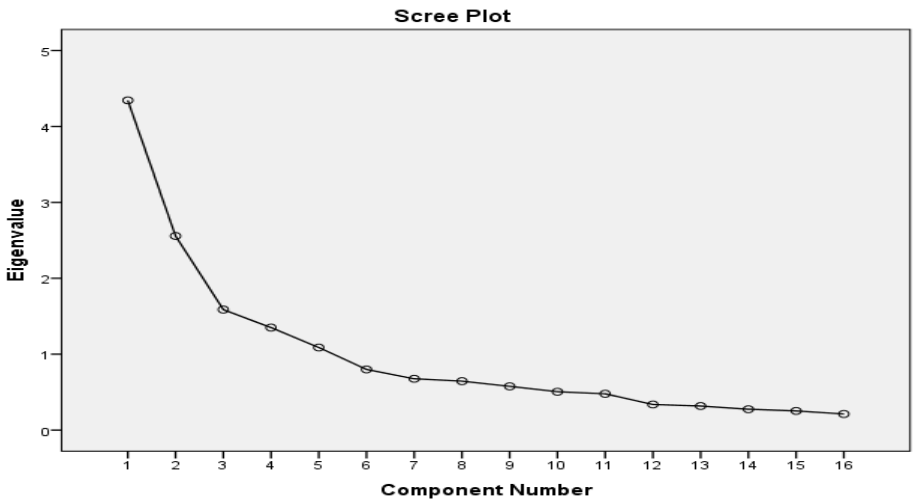

Figure 2. Scree plot for five factors and 16 items.

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Recycling factor consisted of five sub-components including 'I use both sides of papers at home and office and put them in recycling bin' (0.790), 'It is possible to decrease domestic waste and make them productive e.g., I save and reuse glass, plastic and paper packages' (0.788), statement was in the lead. Other statements were; 'I skimp on use of paper napkin, etc., under every conditions' (0.727), 'I prefer recyclable environment friendly packages' (0.694), and 'I try to consume organic products since they do no harm environment' (0.672).

Participation factors were represented by four items: 'I follow programs related to environment on radio and TV' (0.771), 'I participate in official organizations on environment and nature protection' (0.770), 'I participate in afforestation activities' (0.765), and 'I participate in environmental debates' (0.729).

Environmental Protection factors consisted of three items including 'I prefer public transportation though I have a personal vehicle' (0.846), 'I collect used batteries, separate them from others and take them to collecting points' (0.730), and 'I avoid using products causing ozone depletion' (0.574).

'Environmental education' factor had two items including 'I took education on environment' (0.871) and 'I took sufficient education on environmental pollution' (0.851). Lastly, 'Saving' factor had two items: 'I act carefully not to waste water (0.879) and 'I use energy saving devices and machines' (0.786) (Table 5).

After the EFA was applied to test the convenience of factor structures, Kolmogorov Smirnov test was conducted to determine which test was appropriate for the students' awareness, attitude, and behavior. Determination of proper test methods requires examining normal distribution of series. Therefore, the following H_0 and H_1 hypotheses were tested using Kolmogorov-Smirnov Normality test.

H_0: Factors affecting students' attitudes and behaviors towards environment had normal distributions.

H_1: Factors affecting students' attitudes and behaviors towards environment did not have normal distribution.

Based on Kolmogorov-Smirnov Normality test, H_0 hypothesis was rejected since $P < 0.05$ (Table 6). These results meant that the variables did not have normal distribution. For this reason, non-parametric Kruskal Wallis test was used to achieve the second aim of the present study. Using this test, differences between the first and fourth year students in awareness for, attitudes and behaviors towards the environment were studied (Table 7).

Kruskal Wallis test was used to examine whether there was a significant difference between the first and fourth year student for their awareness, attitudes, and behaviors towards the environment (Table 7). Significant differences were found between the first year and fourth year students (in other words, at the beginning and end of agriculture engineering education, respectively) for "Environmental

Table 6. Kolmogorov-Smirnov Normality test.

Variable and Factors	*N*	Mean	Std dev	Test stat	Sig (2-Tailed)
Class	160	0.625	0.485	0.405	0.000
Environmental destruction	160	0.040	1.063	0.132	0.000
Environmental threats	160	0.047	1.041	0.099	0.001
Environmental responsibility	160	0.040	1.034	0.161	0.000
Environmental perspective	160	0.029	1.000	0.112	0.000
Recycling	160	0.001	0.998	0.070	0.045
Participation	160	0.018	1.006	0.072	0.043
Environmental protection	160	-0.018	0.996	0.081	0.012
Environmental education	160	0.017	0.996	0.083	0.009
Saving	160	-0.006	0.995	0.083	0.010

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Table 7. Kruskal-Wallis test on students' attitudes and behaviors towards the environment.

	Grade	N	Mean rank	*Chi*-square	DF	*P* value
Environmental destruction	1st grade	60	103.85	24.388	1	0.000
	4th grade	100	66.49			
Environmental threats	1st grade	60	81.55	0.049	1	0.824
	4th grade	100	79.87			
Environmental responsibility	1st grade	60	91.13	5.058	1	0.025
	4th grade	100	74.12			
Environmental perspective	1st grade	60	81.03	0.013	1	0.910
	4th grade	100	80.18			
Recycling	1st grade	60	79.22	0.074	1	0.786
	4th grade	100	81.27			
Participation	1st grade	60	77.88	0.306	1	0.580
	4th grade	100	82.07			
Environmental protection	1st grade	60	77.15	0.502	1	0.479
	4th grade	100	82.51			
Environmental education	1st grade	60	94.77	9.105	1	0.003
	4th grade	100	71.94			
Saving	1st grade	60	99.17	15.587	1	0.000
	4th grade	100	69.30			

destruction" (P< 0.01), "Environmental responsibility" (P< 0.05), "Environmental education" (P< 0.01) and "Saving" (P< 0.01). On the other hand, no significant difference was observed for "Environmental threat" (P> 0.05), "Environmental perspective" (P> 0.05), "Recycling" (P> 0.05), "Participation" (P> 0.05), and "Environmental protection" (P> 0.05).

DISCUSSION

In the present study, factors affecting Faculty of Agriculture students' awareness, attitudes, and behaviors towards the environment were determined using the EFA. Awareness and attitudinal factors were "Environmental destruction", "Environmental threat", "Environmental responsibility" and "Environmental perspective". Behavioral factors were "Recycling", "Participation", "Environmental protection", "Environmental education" and "Saving".

After the reliability analysis of designated factors, Kruskal-Wallis test was performed to determine if there was a significant difference between the first and fourth year students for awareness, attitudes, and behaviors. A significant difference was observed between the two groups of students for "Environmental destruction" (P< 0.01), "Environmental responsibility" (P< 0.05), "Environmental education" (P< 0.01) and "Saving" (P< 0.01). The most important of these factors was 'Environmental destruction' with its high explanation of variance and highest *Chi*-square value (24.388). 'Environmental destruction' is the

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most important factor affecting the attitudes of students since it includes items of 'Vegetation is destroyed unconsciously and forests disappear', 'Irrational use of fertilizers and pesticides threatens environment and human health', 'Wetlands and water resources disappear, and waters get contaminated', and 'Agricultural areas disappear due to misuse'.

There is evidence that environmental knowledge is a correlate of environmentally responsible behavior among young people (Fransson and Gärling, 1999; Hines *et al.*, 1987). Besides, studies generally show a positive relationship between self-reported knowledge and pro-environmental behavior (e.g. Barr, 2007; Cottrell, 2003), and environmental education programs also have positive impact on supporting environmental policy (Worsley and Skryzpiec, 1998), environmental knowledge and environmentally responsible behavior (Hsu, 2004).

Most of the students were aware that the environment was destroyed unconsciously. Also, their awareness for disappearing wetlands, decreasing and contaminated water resources, and destruction of agricultural areas by misuse was high. Students thought that the families, press, and mass media have responsibilities on developing students' environmental sensibility. They also thought that they were caring for recycling and they had sufficient education about the environment.

Despite the evidence that environmental knowledge is a correlate of environmentally responsible behavior among young people, it is acknowledged that information is necessary but rarely sufficient to motivate environmental behavior. Indeed, no significant differences were found between the first and fourth year students in terms of "Environmental threat" (P> 0.05), "Environmental perspective" (P> 0.05), "Recycling" (P> 0.05), "Participation" (P> 0.05) and "Environmental protection" (P> 0.05) factors. It is reasonable that awareness for environmental protection will not develop when the environmental threats are not recognized properly. A student who cannot perceive environmental threats will not take measures against them, since it is not possible to take precautions without understanding the threats. Students' environmental perspective can develop if the factors threating the environment are identified via education. This perspective will affect students' behavior and increase their awareness for and practice of recycling. The fact that these five factors were statistically insignificant is thought-provoking on whether the education given to students of Faculty of Agriculture is sufficient. Expanding the context of education and raising awareness on these five factors will help develop environmental awareness, attitudes, and behaviors. The curricula cover courses on environment, but student acquisitions are not compatible with the necessities of environmental education. Therefore, it is necessary to make revisions in curricula for the students to gain better knowledge about recycling processes. Results of studies comparing the environmental education in different countries showed that schools with strong orientation towards the environment could convey the knowledge to their students more efficiently than the schools which do not have clear environmental policies (Barraza and Walford, 2010). Successful examples of environmental education models could be studied in detail and adopted in Turkey. In this respect, university education could be used efficiently to organize their relationship with the environment. Besides, devising and implementation of joint projects with non-government organizations would be beneficial to promote public awareness.

There are many factors limiting environmental studies in Turkey such as insufficient ecological, technological, or administrative knowledge of policy-makers, scarcity of material or legal resources, and weaknesses about acquired interests, as in many other countries. Therefore, training of environmentally-sensitive engineers and individuals is a challenging task which

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needs to be accomplished using education in a more efficient manner.

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آموزش های زیست محیطی در دانشکده کشاورزی و تغییر آگاهی، نگرش، و رفتار در زمینه محیط زیست در ترکیه

ه. س. گلش بال، و گ. کاراکاش

چکیده

مسایل محیط زیست به گونه ای فزاینده مخرب شده است. به این دلیل، آموزش و آگاهی دادن در باره محیط زیست از اهمیت برخوردار می باشد. این پژوهش دو هدف داشت: نخست، تعیین عوامل موثر بر نگرش و رفتار دانشجویان دانشکده کشاورزی در زمینه محیط زیست، و سپس ارزیابی این امر که آموزش های داده شده تا چه اندازه تفاوت معنا داری در نگرش و رفتار دانشجویان پدید می آورد. مطاله حاضر روی ۱۶۰ دانشجوی سال اول و سال چهارم دانشکده کشاورزی در دانشگاه Gaziosmanpasaو در سال ۲۰۱۶ اجرا شد. داده ها با استفاده از پرسشنامه رو-در-رو وجمع آوری پاسخ ها به پرسش هایی در باره "مقیاس آگاهی و نگرش زیست محیطی " شامل ۲۱ عنصر(element) و " مقیاس رفتار زیست محیطی" شامل ۲۴ عنصر گردآوری شد. عوامل موثر بر نگرش و رفتار به طور جداگانه با تجزیه تحلیل عاملی اکتشافی (exploratory factor analysis, EFA) تعیین شد. نیز، برای تعیین اختلاف معنادار بین نگرش و رفتار دانشجویان سال اول و سال چهارم، آزمون Kruskal-Wallisبه کار رفت. بر پایه نتایج آزمون Kruskal-Wallis، اختلاف بین دانشجویان سال اول و سال چهارم در مورد "تخریب محیط زیست" و " مسئولیت زیست محیطی" به ترتیب در سطح ($P<0.01$)و ($P<0.05$)معنادار بود. به سخن دیگر، درس های محیط زیستی که دانشجویان در طی ۴ سال در دانشکده برداشته بودند منجر به تحولی در آگاهی و تغییراتی در نگرش آنها شده بود. افزون بر این، بین دانشجویان سال اول و سال چهارم تفاوت معناداری در "آموزش های محیط زیست" در سطح $P<0.01$ و "حفاظت محیط زیست" در سطح $P<0.05$ وجود داشت. این پژوهش نشان داد که با استفاده از برنامه ریزی خوب برای برنامه آموزشی چهار ساله و با حمایت از آموزش کارآمد زیست محیطی، می توان مهندسان کشاورزی را در سطح بالایی در زمینه آگاهی و حساسیت زیست محیطی آموزش داد.

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