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Identification of Ecological Footprint Awareness of Prospective Teachers

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Abstract

The aim of this study is to determine whether the ecological footprint awareness of prospective teachers differ according to the variables of department and gender. This study was conducted on 318 third-year prospective teachers from the Departments of Pre-school, Turkish Language, Science, Mathematics, Guidance and Psychological Counseling, Primary School, Social Science and English Language Education at Faculty of Education. In this study, the "Ecological Footprint Awareness" scale was used as a data collection tool. Descriptive statistics were used in the analysis of the data, one-way ANOVA was used to compare the departments and independent samples t-test was used for the gender variable. In the comparison made in terms of departments in the research, a significant difference was found in ecological footprint awareness in favor of prospective Science Education teachers. In some sub-dimensions, a result in favor of Primary School Education prospective teachers was obtained. In addition, the department that has the lowest ecological footprint awareness is Guidance and Psychological Counseling Education, while English Language Education and Mathematics Education have the lowest scores in some sub-dimensions. When examined according to the gender variable, a significant difference was found in ecological footprint awareness in favor of female prospective teachers. Suggestions were made about the findings obtained.

Öğretmen Adaylarının Ekolojik Ayak İzi Farkındalıklarının Belirlenmesi

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Öz

Bu çalışmanın amacı, öğretmen adaylarının ekolojik ayak izi farkındalıklarının ana bilim dalı ve cinsiyet değişkenine göre farklılık gösterip göstermediğini belirlemektir. Bu çalışma Eğitim Fakültesi'nde öğrenim gören Okul Öncesi Eğitimi, Türkçe Eğitimi, Fen Bilgisi Eğitimi, Matematik Eğitimi, Rehberlik ve Psikolojik Danışmanlık, Sınıf Eğitimi, Sosyal Bilgiler Eğitimi ve İngiliz Dili

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Eğitimi Ana Bilim Dallarındaki 318 üçüncü sınıf öğretmen adayı üzerinde yapılmıştır. Araştırmada veri toplama aracı olarak "Ekolojik Ayak İzi Farkındalığı" ölçeği uygulanmıştır. Verilerin analizinde betimleyici istatistikler, ana bilim dalları arasında karşılaştırma yapmak için tek yönlü varyans analizi (ANOVA), cinsiyet değişkeni için bağımsız örneklemler t-testi kullanılmıştır. Araştırmada ana bilim dalları yönünden yapılan karşılaştırmada Fen Bilgisi Eğitimi Ana Bilim Dalı öğretmen adayları lehine ekolojik ayak izi farkındalıklarında anlamlı bir farklılık tespit edilmiştir. Bazı alt boyutlarda, Sınıf Eğitimi öğretmen adaylarının lehine bir sonuç elde edilmiştir. Ayrıca ekolojik ayak izi farkındalığı en düşük olan ana bilim dalı Rehberlik ve Psikolojik Danışmanlık Eğitimi olmakla birlikte bazı alt boyutlarda ise İngiliz Dili Eğitimi ve Matematik Eğitimi en düşük puana sahiptir. Cinsiyet değişkenine göre incelendiğinde, kadın öğretmen adayları lehine ekolojik ayak izi farkındalıklarında anlamlı bir farklılık tespit edilmiştir. Elde edilen bulgular doğrultusunda önerilerde bulunulmuştur.

Introduction

Human being directly interacts with the environment since his/her creation (Aksu, 2011). As human beings expand their settlements in order to satisfy their needs all through their lives, they also shape natural resources in diverse ways (Yang, Yang, Luo & Huang, 2019). The existing knowledge base is not sufficient for ensuring the sustainability of life and minimizing the negative influence of human beings on the environment. In this regard, besides the existing knowledge base, there is an ecological footprint scale which is acknowledged as an educational tool and likely to have a deeper impact on human beings (Keleş, Uzun & Özsoy, 2008).

Ecological footprint acts as the scale as to what and how much human beings consume in the nature. Calculating the negative effects of human beings on earth by virtue of measuring their existing footprints can give rise to changes in lifestyles of human beings and so sustainability of life can be achieved (Wilson & Anielski, 2005). For Schaller (1999), once the issue of the sustainability of life is addressed, the concept of ecological footprint springs to mind. As human beings consume resources of the earth all through their lives, they simultaneously produce wastes along with this consumption process. All land and water fields necessary for the reproduction of depleted resources and the elimination of wastes make up the ecological footprint (Keleş, 2014; Keleş et al., 2008; WWF, t.y.). In other words, ecological footprint compares the resource to the energy consumption. This method presents the opportunity to perform simple but comprehensive calculations (Wackernagel et al., 1999). Main elements which are taken into consideration in the calculation and affect the make-up of ecological footprint of each individual are food, accommodation, transportation, energy, products (consumer goods) and services (Turkey Ecological Footprint Report, 2012). Ecological footprint is measured in global hectares (gha) (Living Planet Report, 2018). Various non-governmental organizations and educational institutions on a global scale are working on this issue (Lambrechts & Van Liedekerke, 2014; Medina & Toledo-Bruno, 2016) and a sustainable future is aimed. When the literature is examined, there are many studies (Eren, Aygün, Chabanov & Akman, 2016; Gottlieb, Vigoda-Gadot & Haim, 2013; Keleş et al., 2008; Lambrechts & Van Liederke, 2014; Meyer, 2004; Ortegon & Acosta, 2019; Yıldız & Selvi, 2015) on the ecological footprint.

In the study of Meyer (2004), it was aimed to determine the effect of ecological footprint as an educational tool on students' knowledge, attitudes and behaviors towards sustainable life. This study was carried out on the students of the Department of Biomedical and Nursing Sciences and the Department of Chemistry and has a single-group pretest-posttest experimental design. As a result of the research, it was determined that ecological footprint education increased the knowledge, attitude and behavior towards a sustainable lifestyle in a positive way. Keleş et al. (2008) aimed to calculate and evaluate the ecological footprints of teacher candidates (Social Science, Science, Primary School Teaching) in their study. The web-based “Ecological Footprint Calculation Questionnaire” was used in this study on first graders. As a result of the research, it was determined that the ecological footprints of the teacher candidates are above the world average, the sub-dimension that affects the ecological footprint the most is the food sub-dimension, and the ecological footprint results do not differ according to gender. In the study of Gottlieb et al. (2013), it was aimed to determine the effect of ecological footprint on environmental behavior of high

school students. While a training based on the ecological footprint approach was applied in the experimental group, the training specified in the curriculum was continued in the control group. As a result of the research, a significant difference was observed in favor of the experimental group in the variables of perceived behavioral control (PBC), personal norms (PN) and behavioral intentions (BI), while no significant difference was observed in the environmental behavior (PEB) and ecological view (EW) variables in both groups. The ecological footprint of KHLeuven University, which Lambrechts & Van Liederke (2014) determined as a sample in their study, focused on the use of this tool, the creation of educational goals on this subject, and the development of policies. In the study of Ortegon & Acosta (2019) on the use of ecological footprint for environmental management in educational institutions, it was aimed to evaluate the ecological footprint in Colombian Universities and to develop a practical calculation tool. In line with the studies examined, examining the ecological footprint awareness of the various masses that make up the society can enable to see the perspective of each individual that will affect the society and take action accordingly. Considering the place of the human factor in the formation and continuation of environmental problems, it can be thought that examining people's perspectives on the environment can be continuous.

There are various human-induced global and regional environmental problems in the world, and although many research are done to solve these problems, unless sustainable society is established and human beings change their lifestyles, environmental problems will not be solved even though certain precautions are taken in the fields of technology, law, politics and economy (Kawashima, 1998, p. 33). Education plays a key role in tackling these problems (O'Gorman & Davis, 2013). For example, the ecological footprint which was acknowledged to act as the scale of the natural resource consumption for the last five decades, however, increased by 190% according to Living Planet Report (Living Planet Report, 2018). It is argued that, through regulations, it would be possible both to enhance the ecological awareness of human beings and to ensure the sustainability (Akıllı, Kemahlı, Okudan & Polat, 2008; Pena Cerezo, Artaraz-Minon & Tejedor-Nunez, 2019; Yıldız & Selvi, 2015). For this reason, education plays a key role in tackling these problems (O'Gorman & Davis, 2013). Preventing environmental problems and raising the responsiveness and awareness of individuals about the nature can be made possible only through education (Öztürk-Demirbaş, 2015). Teacher is important to the enhancement of awareness of students about environmental issues (Bergman, 2016; Ramadhan, Sukma & Indriyani, 2019; Wanchana, Inprom, Rawang & Ayudhya, 2019). Teacher has a serious responsibility for the formation of behaviors which are specified in advance and intended to be improved (Ekici, 2012; Kurt, 2013). In this case, teachers have a huge responsibility for enabling that human beings become aware of their ecological footprints and reduce their adverse effects on earth (Keleş, 2011). Therefore, determining the awareness of prospective teachers about the ecological footprint is a subject that needs to be emphasized, and it is thought that the comparison of the results to be obtained from various samples can contribute to the studies in this field. The aim of this research is to determine the prospective teachers' ecological footprint awareness according to department and gender variables. The sub-problems of the research are given below.

1. Do prospective teachers' ecological footprint awareness scores differ according to the department variable?

2. Do prospective teachers' ecological footprint awareness scores differ according to the gender variable?

Method

Research Design

Survey design was used in this research, which aims to determine the ecological footprint awareness of prospective teachers according to department and gender variables. With the survey design, it is aimed to provide information about the characteristics of the group consisting of a large number of participants (Büyüköztürk, Kılıç-Çakmak, Akgün, Karadeniz & Demirel, 2018, p. 15).

Population and Sample

The population of this research consists of Pre-school Education, Turkish Language Education, Science Education, Mathematics Education, Guidance and Psychological Counseling Education, Primary School Education, Social Science Education and English Language Education Department, which is educated at Faculty of Education at a public university in Turkey the 2018-2019 academic year. The sample consists of third grade prospective teachers who are studying in these eight departments and selected by convenience sampling method. The convenience sampling process enables the collection of data from a sample who are convenient and easily accessible sample (Büyüköztürk et al., 2018, p. 95). Demographics of the sample are demonstrated in Table 1 and Table 2.

Table 1. Descriptive Statistics by the Departments

Departments	F	%
Pre-school Education	43	13.52
Turkish Language Education	35	11.01
Science Education	52	16.35
Math Education	36	11.32
Guidance and Psychological Counseling Education	34	10.70
Primary School Education	35	11.01
Social Science Education	46	14.47
English Language Education	37	11.64

Table 1 introduces that 13.52% of prospective teachers are enrolled as the third-year students of Pre-school Education (N=43), 11.01% of prospective teachers are enrolled as the third-year students of Turkish Language Education (N=35), 16.35% of prospective teachers are enrolled as the third-year students of Science Teaching (N=52), 11.32% of prospective teachers are enrolled as the third-year students of Math Education (N=36), 10.70% of prospective teachers are enrolled as the third-year students of Guidance and Psychological Counseling Education (N=34), 11.01% of prospective teachers are enrolled as the third-year students of Primary School Education (N=35), 14.47% of prospective teachers are enrolled as the third-year students of Social Science Education (N=46), 11.64% of prospective teachers are enrolled as the third-year students of English Language Education (N=37).

Table 2. Descriptive Statistics for the Gender Variable

Gender	F	%
Male	106	33.30
Female	212	66.70
Total	318	100

As per Table 2, 33.30% of participants are the male (N=106) whereas 66.70% of prospective teachers who participate in the research are the female (N=212). Research sample is composed of a total of 318 prospective teachers.

Data Collection Tool

"Ecological Footprint Awareness Scale" developed by Çelik-Coşkun & Sarıkaya (2014), which was determined in line with the purpose of the research, was used after obtaining the necessary application permissions.

Ecological Footprint Awareness Scale. Ecological Footprint Awareness Scale developed by Coşkun & Sarıkaya (2013) is composed of a total of 46 items. The scale contains 5 sub-scales: (i) food, (ii) transportation & accommodation, (iii) energy, (iv) wastes and (v) water consumption. Without changing this order of items, food sub-scale includes 8 items, transportation & accommodation sub-scale includes 9

items, energy sub-scale includes 15 items and water consumption sub-scale includes 5 items in the scale. It is a 5-point Likert-type scale. The scale was scored on the basis of the following options: “I Absolutely Disagree (1 point)”, “I Disagree (2 points)”, “I Cannot Decide (3 points)”, “I Agree (4 points)”, “I Absolutely Agree (5 points)”. The KMO value calculated for the factor analysis was .86, and the results of the Bartlett Test (X^2=4408.09, Sd=1035, p=.000) were determined. The rate of explaining the scale items of the sub-dimensions was found to be 42.49%. The Cronbach Alpha value for each sub-dimension is .70, .76, .86, .81, .68, respectively (Çelik-Coşkun & Sarıkaya, 2014). Cronbach’s Alpha value for the scale was calculated as 0.92. Cronbach’s Alpha values were also calculated for each sub-scale, that is, 0.61 for food sub-scale, 0.74 for transportation & accommodation sub-scale, 0.80 for energy sub-scale, 0.76 for wastes sub-scale and 0.80 for water consumption sub-scale. As Cronbach’s Alpha values are quite close to 1, the scale can be considered as highly reliable.

Data Analysis

In the study, first of all, missing value analysis among the scale items, and then normality test was performed. Considering the results of the Kolmogorov-Smirnov test (McKillup, 2012, pp. 321-322) in cases where the sample size is more than 35, it was determined that the data showed a normal distribution. One-way analysis of variance (ANOVA) was used for the analysis of interdepartmental comparison and independent samples t-test was used to determine whether there was a significant difference in terms of ecological footprint awareness scores according to gender variable. When ANOVA F test is significant, Post-Hoc test are used. Post-Hoc test was performed to uncover specific differences between the groups. Considering the homogeneity of the variances; The Tukey test (If the variances are homogeneous) was conducted in the sub-scales of food, transportation and accommodation, energy and the Tamhane T2 test (If the variances are not homogeneous) in the sub-scales of waste and water consumption.

Findings

Table 3. One-way ANOVA Statistics by Departments for Total Scores Obtained from Ecological Footprint Awareness Scale

Source of Variance	SS	DF	MS	F	p	Tukey Test
Inter-group	18254.581	7	2607.797	5.506	.000*	1-3, 2-3, 3-4, 3-5, 5-6, 3-7, 3-8
Intra-group	146812.437	310	473.589			
Total	165067.019	317				

*p<.05

The review of Table 3 indicates that a significant difference was determined between the departments on the basis of total points when the ecological footprint awareness scores of the department variable were examined, when the results of one-way analysis of variance (ANOVA) were examined (F=5.506, p=.000). As a result of the Post-Hoc analysis, which was conducted to examine which majors differed significantly, the prospective teachers of the Science Education Department and Pre-School Education, Turkish Language Education, Mathematics Education, Guidance and Psychological Counseling Education, Social Science Education, English Language Education Department and it has been observed that there is a significant difference between prospective teachers of Psychological Counseling and Guidance Education and Primary School Education Departments.

Table 4. Descriptive Statistics for Total Score of Different Departments

Departments	N	$\bar{X}$	SD
Pre-school Education	43	161.98	16.64
Turkish Language Education	35	158.59	22.70
Science Education	52	175.90	17.49
Math Education	36	155.67	22.59
Guidance and Psychological Counseling Education	34	153.42	28.48
Primary School Education	35	170.43	23.96

Social Science Education	46	157.28	24.11
English Language Education	37	158.93	18.09

The review of Table 4 indicates that it was determined that the significant difference between the departments indicated in Table 3 was in favor of the prospective teachers of the Science Education Department ($\bar{X}$=175.90) in the first comparison, while in the second comparison it was determined that it was in favor of the prospective teachers of the Primary School Education Department ($\bar{X}$=170.43). In addition, the department that has the lowest score is Guidance and Psychological Counseling Education ($\bar{X}$=153.42).

Table 5. One-Way Variance (ANOVA) Results of the Ecological Footprint Awareness Scale Food Sub-Scale Score for the Variable by Department

Source of Variance	SS	DF	MS	F	p	Tukey Test
Inter-group	519.871	7	74.267	4.337	.000*	2-3, 3-4, 3-5, 3-7, 3-8
Intra-group	5308.672	310	17.125			
Total	5828.543	317				

*p<.05

The review of Table 5 indicates that a significant difference was determined between the departments in the food sub-scale when the results of the ecological footprint awareness scores of the department variable and one-way analysis of variance (ANOVA) were examined (F=4.337, p=.000). As a result of the Post-Hoc analysis carried out to examine which majors there are significant differences between, the prospective teachers of the Science Education Department and the prospective teachers of Turkish Language Education, Mathematics Education, Guidance and Psychological Counseling Education, Social Science Education, English Language Education Departments significant difference was observed.

Table 6. Descriptive Statistics for Food Sub-Scale

Departments	N	$\bar{X}$	SD
Pre-school Education	43	23.65	3.76
Turkish Language Education	35	23.09	3.53
Science Education	52	26.17	3.68
Math Education	36	23.05	4.78
Guidance and Psychological Counseling Education	34	23.18	4.02
Primary School Education	35	23.82	4.89
Social Science Education	46	23.30	3.98
English Language Education	37	21.62	4.51

The review of Table 6 indicates that it has been determined that the significant difference between the departments indicated in Table 5 is in favor of the Science Education Department prospective teachers. In addition, it was observed that the prospective teachers of the Department of Science Education had the highest average ($\bar{X}$=26.17). In addition, the department that has the lowest score is English Language Education ($\bar{X}$=21.62).

Tablo 7. One-Way Variance (ANOVA) Results of the Ecological Footprint Awareness Scale Transportation and Accommodation Sub-Scale Scores of the Variable of the Department

Source of Variance	SS	DF	MS	F	p	Tukey Test
Inter-group	732.189	7	104.598	3.414	.002*	3-4, 3-5, 3-7
Intra-group	9497.968	310	30.639			
Total	10230.157	317				

*p<.05

The review of Table 7 indicates that when the ecological footprint awareness scores of the department variable are examined, a one-way analysis of variance (ANOVA) results reveal a significant difference between departments in the sub-scale of transportation and accommodation (F=3.414, p=.002). As a result

of the Post-Hoc analysis, which was conducted to examine which majors differed significantly, it was observed that there was a significant difference between the prospective teachers of the Science Education Department and the prospective teachers of the Mathematics Education, Guidance and Psychological Counseling Education, Social Science Education Departments.

Table 8. Descriptive Statistics for Transportation and Accomodation Sub-Scale

Departments	N	$\overline{X}$	SD
Pre-school Education	43	27.74	4.34
Turkish Language Education	35	28.69	6.10
Science Education	52	30.84	4.60
Math Education	36	27.01	5.47
Guidance and Psychological Counseling Education	34	25.82	5.69
Primary School Education	35	28.48	6.49
Social Science Education	46	26.75	6.60
English Language Education	37	27.33	4.82

The review of Table 8 indicates that it has been determined that the significant difference between the departments stated in Table 7 is in favor of the Science Education Department prospective teachers. Also, it was observed that the prospective teachers of the Department of Science Education ($\overline{X}$=30.84) had the highest average. In addition, the department that has the lowest score is Guidance and Psychological Counseling Education ($\overline{X}$=25.82).

Table 9. One-Way Variance (ANOVA) Results of the Ecological Footprint Awareness Scale Energy Sub-Scale Scores of the Variable of the Department

Source of Variance	SS	DF	MS	F	p	Tukey Test
Inter-group	2120.376	7	302.911	3.733	.001*	3-4, 3-7, 4-6, 6-7
Intra-group	25153.157	310	81.139			
Total	27273.533	317				

*p<.05

The review of Table 9 indicates that, a significant difference was determined between the departments in the energy sub-scale when the results of the ecological footprint awareness scores of the department variable and one-way analysis of variance (ANOVA) were examined (F=3.733, p=.001). As a result of the Post-Hoc analysis carried out to examine which majors there are significant differences between, the prospective teachers of the Science Education Department and the prospective teachers of Mathematics Education and Social Studies Education, as well as it has been observed that there is a significant difference between the prospective teachers of the Primary School Education Department and Mathematics Education, Social Science Education Departments.

Table 10. Descriptive Statistics for Energy Sub-Scale

Departments	N	$\overline{X}$	SD
Pre-school Education	43	58.39	7.55
Turkish Language Education	35	57.47	9.05
Science Education	52	62.59	8.07
Math Education	36	55.75	8.91
Guidance and Psychological Counseling Education	34	56.76	12.18
Primary School Education	35	62.74	7.65
Social Science Education	46	56.30	10.49
English Language Education	37	58.72	7.47

The review of Table 10 indicates that it has been determined that the significant difference between the departments indicated in Table 9 is in favor of the prospective teachers of the Science Department in the first comparisons, while in the second comparisons it is determined that it is in favor of the prospective teachers of the Primary School Education Department. It has been observed that the prospective teachers

of the Primary School Education Department have the highest average ($\bar{X}$=62.74), and at the same time, they have a very close average with the prospective teachers of the Science Education Department ($\bar{X}$=62.59). In addition, the department that has the lowest score is Mathematics Education ($\bar{X}$=55.75).

Table 11. One-Way Variance (ANOVA) Results of the Ecological Footprint Awareness Scale Wastes Sub-Scale Scores of the Variable of the Department

Source of Variance	SS	DF	MS	F	p	Tamhane T2 Test
Inter-group	1303.244	7	186.178	5.420	.000*	3-2, 3-4, 3-5, 3-8, 5-6
Intra-group	10648.039	310	34.349			
Total	11951.283	317				

*p<.05

The review of Table 11 indicates that when the results of the one-way analysis of variance (ANOVA) of the ecological footprint awareness scores of the department variable are examined, a significant difference was determined between the departments in the wastes sub-scale (F=5.420, p=.000). As a result of the Post-Hoc analysis carried out in order to examine which majors there are significant differences between, the prospective teachers of the Science Education Department and the Turkish Language Education, Mathematics Education, Psychological Counseling and Guidance Education, English Language Education Departments, and also Guidance and Psychological Counseling Education as well as it has been observed that there is a significant difference between the prospective teachers of Psychological Counseling and Guidance Education and Primary School Education Departments.

Table 12. Descriptive Statistics for Wastes Sub-Scale

Departments	N	$\bar{X}$	SD
Pre-school Education	43	33.72	4.77
Turkish Language Education	35	31.08	6.67
Science Education	52	36.51	4.14
Math Education	36	32.29	6.16
Guidance and Psychological Counseling Education	34	30.08	7.48
Primary School Education	35	35.57	6.16
Social Science Education	46	33.24	6.66
English Language Education	37	32.58	4.78

The review of Table 12 indicates that it was determined that the significant difference between the departments indicated in Table 11 was in favor of the prospective teachers of the Science Education Department ($\bar{X}$=36.51) in the first comparison, while in the second comparison it was determined that it was in favor of the prospective teachers of the Primary School Education Department ($\bar{X}$=35.57). It was observed that the prospective teachers of the Department of Science Education had the highest average ($\bar{X}$=36.51). In addition, the department that has the lowest score is Guidance and Psychological Counseling Education ($\bar{X}$=30.08).

Table 13. One-Way Variance (ANOVA) Results of the Ecological Footprint Awareness Scale Water Consumption Sub-Scale Scores of the Variable of the Department

Source of Variance	SS	DF	MS	F	p
Inter-group	241.954	7	34.565	2.272	.029*
Intra-group	4716.139	310	15.213		
Total	4958.093	317			

*p<.05

The review of Table 13 indicates that when the results of the one-way analysis of variance (ANOVA) of the ecological footprint awareness scores of the department variable are examined, a significant difference is detected between the departments in the sub-scale of water consumption (F=2.272, p=.029), but there was no difference between the groups as a result of the Post-Hoc analysis, which was conducted to examine which majors differed significantly.

Table 14. Descriptive Statistics for Water Consumption Sub-Scale

Departments	N	$\overline{X}$	SD
Pre-school Education	43	18.46	3.29
Turkish Language Education	35	18.24	3.61
Science Education	52	19.77	3.13
Math Education	36	17.55	3.76
Guidance and Psychological Counseling Education	34	17.55	4.62
Primary School Education	35	19.80	3.98
Social Science Education	46	17.66	5.14
English Language Education	37	18.66	3.27

The review of Table 14 indicates that it has been observed that although the averages of the prospective teachers of the Primary School Education and Science Education Departments are very close to each other ($\overline{X}$=19.80; $\overline{X}$=19.77), the prospective teachers of the Primary School Education Department have the highest average ($\overline{X}$=19.80). In addition, the department that has the lowest score is Mathematics Education ($\overline{X}$=17.55) and Guidance and Psychological Counseling Education ($\overline{X}$=17.55).

Table 15. Unpaired t-Test Statistics for Ecological Footprint Awareness Scores of Prospective Teachers on the basis of the Gender Variable

Sub-scales	Gender	N	$\overline{X}$	SD	t	p
Food	Male	106	22.89	4.72	-2.139	.033*
	Female	212	23.97	4.01		
Transportation & Accommodation	Male	106	27.28	6.65	-1.371	.172
	Female	212	28.29	5.10		
Energy	Male	106	55.98	10.07	-3.595	.000*
	Female	212	60.08	8.54		
Wastes	Male	106	31.57	6.39	-3.696	.000*
	Female	212	34.22	5.82		
Water Consumption	Male	106	18.42	4.33	-0.278	.781
	Female	212	18.55	3.76		
Total	Male	106	156.16	26.03	-3.103	.002*
	Female	212	165.14	20.44		

*p<.05

The review of Table 15 indicates that a significant difference was determined in favor of female prospective teachers ($\overline{X}$=165.14) on the basis of total scores according to the results of the independent samples t-test in the ecological footprint awareness scores of the gender variable (t= -3.103, p=.002). When considered in terms of sub-scales, a significant difference was found in the sub-scales of food, energy and wastes (t= -2.139, p=.033; t= -3.595, p=.000; t= -3.696, p=.000), except for the sub-dimensions of transportation and accommodation (t= -1.371, p=.172), water consumption (t= -0.278, p=.781), and this difference is in favor of female prospective teachers ($\overline{X}$=23.97; $\overline{X}$=60.08; $\overline{X}$=34.22).

Discussion and Conclusion

In this study, prospective teachers' awareness of ecological footprints was examined according to department and gender variables and interpreted made in line with the data obtained.

Considering the ecological footprint awareness scale scores of the department variable of the prospective teachers, a significant difference was found in favor of the Science Education Department prospective teachers in terms of both the total score and the sub-dimension scores of food, transportation and accommodation and waste. In terms of energy and water consumption sub-dimension scores, although the average of the Science Education prospective teachers is very close to the average of the Primary School Education prospective teachers, a result in favor of the Primary School Education prospective teachers was obtained. In addition, the departments with the lowest averages were examined. The department that has the lowest average ecological footprint awareness in terms of total points is Guidance and Psychological Counseling Education; English Language Education in the food sub-dimension, Guidance and Psychological Counseling Education in the transportation and accommodation sub-dimension, Mathematics Education in the energy sub-dimension, Guidance and Psychological Counseling in the waste sub-dimension, in the sub-dimension of water consumption, Guidance and Psychological Counseling Education and Mathematics Education. Having compulsory/elective courses and acquisitions involving environmental issues in the Science Education Undergraduate Program (Council of Higher Education [YÖK], 2018), and finding acquisitions that there is direct or indirect environmental in the Science course in the curriculum implemented by the Ministry of National Education [MEB] (Demir & Yalçın, 2014) can suggest that science and ecology education are closely related, and this situation supports the findings. With this situation, it can be stated that it can be a normal result considering that the field of Science covers environmental issues. At the same time, when the Primary School Teaching Undergraduate Curriculum is examined in order to get an idea about Classroom Education, it is seen that there are compulsory/elective courses and acquisitions (YÖK, 2018) that include environmental issues similar to Science Education. Studies stating that environmental education is important at primary education level (Demir & Yalçın, 2014; Şimşekli, 2004) may explain the higher results in these areas compared to other areas. For example, when we look at the Guidance and Psychological Counseling Education Undergraduate Curriculum that has the lowest score; sustainable environment, ecology education etc. it is seen that there is an elective course called "Sustainable Development and Education", which includes the achievements, but on the contrary, it is not a compulsory course that deals with environmental issues. This situation is the same in Primary Mathematics Education Teaching and English Language Teaching Undergraduate Curriculum. In the study of Çelenk (2019), it was determined that the ecological footprint awareness of Social Science Education prospective teachers was higher than other prospective teachers (Foreign Language Education, Science Education, Primary School Education, Fine Arts Education). When the Social Science Teaching Curriculum is examined, it is observed that there are compulsory/elective courses and acquisitions (YÖK, 2018) that include environmental issues, similar to Science Education and Primary School Education. In addition, when the Social Science curriculum is examined, it is observed that environmental concepts, values and skills are included (Öztürk & Zayimoğlu-Öztürk, 2016). On the contrary, in this study, pre-service teachers of the Social Science Education Department lagged behind in terms of ecological footprint awareness. In line with the studies examined and the findings obtained; It can be thought that individuals may have a perception that Science and Primary School Education fields should take more responsibility on environmental issues, and the curriculum and curricula are shaped in this direction. In addition, it can be stated that environmental perspectives can be shaped outside of the courses in the curriculum, and the individual characteristics of the teacher candidates and the environment they are in (the faculty where they study, etc.) can be effective.

Considering the ecological footprint awareness scale scores of the gender variable of the prospective teachers, significant differences were obtained in favor of female prospective teachers in terms of both the total score and some sub-scales. In this case, it can be expressed that the significant difference obtained in the total score consists of the significant difference in the sub-scale of food, energy and waste. When the findings are interpreted, it can be stated that women have a more environmentalist perspective than men in terms of food, energy and waste, which play a role in the formation of the ecological footprint that emerges as a result of production, consumption and disposal processes. As the reason for this result, it can be thought that women are more active in the home environment than men, and their knowledge and experience in subjects such as cooking, using electronic goods at home, and disposal of waste at home can positively affect their awareness of ecological footprints. When the primitive period human-nature relations are considered, it can be said that the distribution of duties of men and women (Atasoy, 2006, s. 3; Erdem,

2000, s. 23-24) in keeping the house has taken place in the minds with the development process until today, depending on the today's technologies. For this reason, it can be stated that female prospective teachers affect their ecological footprint awareness more than males. Although there is an awareness in favor of female prospective teachers in the sub-scales of transportation, accommodation and water consumption, no significant difference has been detected. For this reason, it can be stated that female prospective teachers affect their ecological footprint awareness more than males. Although there is an awareness in favor of female prospective teachers in the sub-scales of transportation, accommodation and water consumption, no significant difference has been detected. In the study of Çelik-Coşkun & Sarıkaya (2014), in which they aimed to determine the ecological footprint awareness levels of primary school prospective teachers, a significant difference was found in favor of women in the sub-scales of energy, waste and water consumption. Similarly, obtaining a result in favor of female prospective teachers in the sub-scales of energy and waste as the reason for this; women are generally more active in activities than men housework, etc., it has been stated that they are more conscious about the importance of saving in the use of energy-operated devices and the elimination of waste. On the contrary, in this study, there was no difference in the use of water according to the gender variable. Considering that water consumption is needed in many activities such as production, consumption, waste disposal, cleaning, it can be interpreted that there is no difference due to the widespread use of water. Uyanık (2020) also observed a significant difference in favor of women in his research with prospective primary school teachers, and stated that it may be effective that women give more importance to the environment and take care of housework more. There are various studies (Günal, 2018; Gündüz & Alsagher, 2018) that support similar findings. On the contrary, there are also studies (Eren, Aygün, Chabanov & Akman, 2016; Özgen & Demirci-Aksoy, 2017) that obtained results in favor of men. In addition, when the study of Sivrikaya (2018) with Science and Turkish Education prospective teachers and Çelenk (2019) with prospective teachers were examined, it was observed that there was no significant difference in the gender variable. Çelik-Coşkun & Sarıkaya (2014) stated that no difference was observed in the dimensions of transportation and accommodation, because the prospective teachers have limited economic income as they are students, and this situation may affect them in a similar way in terms of transportation and accommodation.

As a result; By comparing the ecological footprint awareness of various departments, it is thought that it will contribute to the literature on considering the similarities and differences of the departments in terms of environmental perspective. The weight of environmental issues and achievements in curriculum and curricula may be effective in the fact that Science Education and Classroom Education Departments have higher ecological footprint awareness compared to other departments. In addition, it can be said that the individual characteristics of teacher candidates and the environment they are in may be effective. It can give an idea that gender difference is also an issue that needs to be emphasized for scientific studies to reduce the ecological footprint. Suggestions were made about the results obtained.

1. Compulsory courses containing environmental issues and achievements can be added to the undergraduate curriculum, and environmental practices can be made. In this way, responsible individuals who are aware of their ecological footprints can be raised in all areas.

2. The effects of different variables (individual characteristics, faculty, etc.) that are thought to effect ecological footprint awareness can be examined in depth.

3. The knowledge, attitudes and behaviors towards food, transportation and accommodation, energy, wastes and water consumption that make up the ecological footprint can be examined in depth on the basis of departments, and it can be examined according to what kind of factors the footprint of individuals belonging to each area changes. In this direction, policies can be developed to reduce the ecological footprint. In this way, positive behavioral changes can be achieved in food consumption, transportation and accommodation, energy use, waste management and water consumption.

4. The knowledge, attitudes and behaviors towards food, transportation and accommodation, energy, waste and water consumption that make up the ecological footprint can be examined in depth on the basis of gender, and it can be examined according to what kind of factors it changes. Thanks to the policies to be developed in this direction, the ecological footprint can be reduced.

5. Ecological footprint awareness can be examined with larger and different samples.

Notes

This study is revised version of "" which was presented as an oral presentation at an international congress in 2019.

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Genişletilmiş Özet

Bu çalışmanın amacı, öğretmen adaylarının ekolojik ayak izi farkındalıklarının ana bilim dalı ve cinsiyet değişkenine göre farklılık gösterip göstermediğini incelemektir. Betimsel (tarama) modelin kullanıldığı bu çalışma bir devlet üniversitesinin Eğitim Fakültesi'nde öğrenim gören Okul Öncesi Eğitimi, Türkçe Eğitimi, Fen Bilgisi Eğitimi, Matematik Eğitimi, Rehberlik ve Psikolojik Danışmanlık, Sınıf Eğitimi, Sosyal Bilgiler Eğitimi ve İngiliz Dili Eğitimi Ana Bilim Dallarındaki 318 üçüncü sınıf öğretmen adayı üzerinde yapılmıştır. Bu araştırmada veri toplama aracı olarak "Ekolojik Ayak İzi Farkındalığı" ölçeği uygulanmıştır. Verilerin analizinde betimleyici istatistikler, ana bilim dalları arasında karşılaştırma yapmak için tek yönlü varyans analizi (ANOVA), cinsiyet değişkeni için ise bağımsız örneklemler t-testi, kullanılmıştır. Araştırmadan elde edilen bulgular yorumlanarak sonuca varılmıştır. Öğretmen adaylarının ana bilim dalı değişkenine ait ekolojik ayak izi farkındalık ölçeği puanları ele alındığında hem toplam puan hem de gıda, ulaşım ve barınma, atıklar alt boyut puanları bakımından Fen Bilgisi Eğitimi Ana Bilim Dalı öğretmen adayları lehine anlamlı bir farklılık tespit edilmiştir. Enerji ve su tüketimi alt boyut puanları bakımından ise Fen Bilgisi Eğitimi öğretmen adaylarının ortalaması Sınıf Eğitimi öğretmen adaylarının ortalamasına çok yakın olmakla birlikte Sınıf Eğitimi öğretmen adaylarının lehine bir sonuç elde edilmiştir. Ayrıca en düşük ortalamaya sahip ana bilim dalları incelenmiştir. Ekolojik ayak izi farkındalığı toplam puan bazında en düşük ortalamaya sahip olan ana bilim dalı Rehberlik ve Psikolojik Danışmanlık Eğitimi, gıda alt boyutunda İngiliz Dili Eğitimi, ulaşım ve barınma alt boyutunda Rehberlik ve Psikolojik Danışmanlık Eğitimi, enerji alt boyutunda Matematik Eğitimi, atıklar alt boyutunda Rehberlik ve Psikolojik Danışmanlık Eğitimi, su tüketimi alt boyutunda ise Rehberlik ve Psikolojik Danışmanlık Eğitimi ve Matematik Eğitimidir. Fen Bilgisi Öğretmenliği Lisans Öğretim Programında çevre konularını içeren zorunlu/seçmeli dersler ve kazanımların olması (YÖK, 2018), ayrıca Milli Eğitim Bakanlığı [MEB] tarafından uygulanmakta olan ders programlarında Fen Bilimleri dersinde çevreye yönelik doğrudan ya da dolaylı olarak kazanımlar bulunması (Demir ve Yalçın, 2014) Fen Bilimleri ile ekoloji eğitiminin birbiriyle yakından bağlantılı olduğu konusunda fikir yürütebilir ve bu durum elde edilen bulguları destekler niteliktedir. Bu durum ile Fen Bilgisi alanının çevre konularını kapsadığı düşünüldüğünde olağan bir sonuç olabileceği ifade edilebilir. Aynı zamanda Sınıf Eğitimine yönelik olarak fikir edinmek için Sınıf Öğretmenliği Lisans Öğretim Programı da incelendiğinde Fen Bilgisi Eğitimi ile benzer olarak çevre konularını içeren zorunlu/seçmeli dersler ve kazanımların (YÖK, 2018) olduğu görülmektedir. İlköğretim kademesinde çevre eğitiminin önemli olduğunu (Demir ve Yalçın, 2014; Şimşekli, 2004) belirten çalışmalar, bu alanlarda diğer alanlara nazaran daha yüksek sonuçlar elde edilmesini açıklayabilir. Örneğin en düşük puana sahip olan Rehberlik ve Psikolojik Danışmanlık Öğretmenliği Lisans Öğretim Programına göz atıldığında; sürdürülebilir çevre, ekoloji eğitimi vb. kazanımları içeren "Sürdürülebilir Kalkınma ve Eğitim" adında seçmeli ders olduğu, aksine çevre konularını ele alan zorunlu bir ders olmadığı görülmektedir. Bu durum İlköğretim Matematik Öğretmenliği ve İngilizce Öğretmenliği Lisans Öğretim Programlarında da aynı şekildedir. Çelenk (2019)'un yaptığı çalışmada ise Sosyal Bilgiler Eğitimi öğretmen adaylarının ekolojik ayak izi farkındalıklarının diğer öğretmen adaylarına (Yabancı Diller Eğitimi, Fen Bilgisi Eğitimi, Sınıf Eğitimi, Güzel Sanatlar Eğitimi) göre daha yüksek olduğu tespit edilmiştir. Sosyal Bilgiler Öğretmenliği Öğretim Programı incelendiğinde ise Fen Bilgisi Eğitimi ve Sınıf Eğitimi ile benzer olarak çevre konularını içeren zorunlu/seçmeli dersler ve kazanımların (YÖK, 2018) olduğu gözlemlenmektedir. Ayrıca Sosyal Bilgiler ders programına göz atıldığında çevreye yönelik kavram, değer ve becerilere yer verildiği gözlemlenmiştir (Öztürk ve Zayimoğlu-Öztürk, 2016). Aksine bu çalışmada Sosyal Bilgiler Eğitimi Ana Bilim Dalı öğretmen adayları ekolojik ayak izi farkındalığı yönünden daha geride kalmıştır. İncelenen çalışmalar ve elde edilen bulgular doğrultusunda; bireylerin Fen Bilgisi ve Sınıf Eğitimi alanlarının çevre konuları üzerinde daha çok sorumluluk alması gerektiği konusunda bir algıya sahip olabileceği ve öğretim program ve müfredatlarının da bu doğrultuda şekillendiği düşünülebilir. Bunun yanı sıra çevreye yönelik bakış açılarının öğretim programında yer alan derslerin haricinde şekillenebileceği, öğretmen adaylarının bireysel özelliklerinin ve bulunduğu çevrenin (öğrenim gördüğü fakülte vb.) etkili olabileceği ifade edilebilir.

Öğretmen adaylarının cinsiyet değişkenine ait ekolojik ayak izi farkındalık ölçeği puanları ele alındığında hem toplam puan hem de bazı alt boyutlar bakımından kadın öğretmen adayları lehine anlamlı farklılıklar elde edilmiştir. Bu durum toplam puanda elde edilen anlamlı farklılığın gıda, enerji ve atıklar alt boyutunda meydana gelen anlamlı farklılıktan oluştuğu söylenebilir. Elde edilen bulgu yorumlandığında

üretim, tüketim ve bertaraf etme süreçlerinin bir sonucu olarak ortaya çıkan ekolojik ayak izinin oluşmasında rol oynayan gıda, enerji ve atıklar boyutunda kadınların erkeklere göre daha çevreci bir bakış açısına sahip oldukları ifade edilebilir. Bu sonucun sebebi olarak kadınların ev ortamında erkeklere nazaran daha aktif olup yemeğin yapımı, evdeki elektronik eşyaların kullanımı, evde oluşan atıkların bertaraf edilmesi gibi konulardaki bilgi ve deneyimlerinin ekolojik ayak izi farkındalıklarını olumlu yönde etkileyebileceği düşünülebilir. İlkel dönem insan-doğa ilişkileri ele alındığında evin geçindirilmesinde kadın ve erkeğin yaptığı görev dağılımlarının (Atasoy, 2006, s. 3; Erdem, 2000, s. 23-24) zamanın teknolojilerine bağlı olarak günümüze kadarki gelişim süreci ile zihinlerde yer edindiği de söylenebilir. Bu sebeple de erkeklere göre kadın öğretmen adaylarının ekolojik ayak izi farkındalıklarını daha çok etkilediği ifade edilebilir. Ulaşım ve barınma, su tüketimi boyutlarında az da olsa kadın öğretmen adayları lehine bir farkındalık görülse de anlamlı bir farklılık tespit edilmemiştir. Çelik-Coşkun ve Sarıkaya (2014)'ün sınıf öğretmeni adaylarının ekolojik ayak izi farkındalık düzeylerini belirlemeyi amaçladıkları çalışmalarında enerji, atıklar ve su tüketimi boyutlarında kadınlar lehine anlamlı farklılık tespit edilmiştir. Benzer olarak enerji ve atıklar boyutlarında kadın öğretmen adayları lehine bir sonuç elde edilmesinin kadınların ev işleri vb. faaliyetlerde erkeklere göre genellikle daha aktif olduğu, enerji ile çalışan cihazların kullanımında tasarrufun önemsenmesi, atıkların yok edilmesi konularında daha bilinçli oldukları ifade edilmiştir. Aksine bu çalışmada suyun kullanımına yönelik cinsiyet değişkenine göre farklılık görülmemiştir. Üretim, tüketim, atıkların bertaraf edilmesi, temizlik gibi birçok faaliyette su tüketimine ihtiyaç duyulduğu düşünülecek olursa suyun yaygın kullanımından kaynaklı olarak farklılık oluşmadığı şeklinde yorumlanabilir. Uyanık (2020)'nin de sınıf öğretmen adayları ile yaptığı araştırmada kadınlar lehine anlamlı bir farklılık gözlemlemiş, bunu kadınların çevreye daha fazla önem vermesinin ayrıca ev işleriyle daha çok ilgilenmesinin etkili olabileceğini belirtmiştir. Benzer olarak elde edilen bulguları destekler nitelikte çeşitli çalışmalar (Günal, 2018; Gündüz & Alsagher, 2018) bulunmaktadır. Aksine erkekler lehine sonuç elde eden çalışmalar (Eren, Aygün, Chabanov ve Akman, 2016; Özgen ve Demirci-Aksoy, 2017) da bulunmaktadır. Ayrıca Sivrikaya (2018)'in Fen Bilgisi ve Türkçe öğretmen adayları ile Çelenk (2019)'un öğretmen adayları ile gerçekleştirdiği çalışmasına bakıldığında cinsiyet değişkeninde anlamlı bir farklılık oluşmadığı gözlemlenmiştir. Çelik-Coşkun ve Sarıkaya (2014) ulaşım ve barınma boyutunda farklılığın gözlemlenmemesi durumunu öğretmen adaylarının öğrenci oldukları için ekonomik yönden gelirlerinin sınırlı olması ve bu durumun onları ulaşım ve barınma konusunda benzer şekilde etkileyebileceğini ifade etmiştir.

Sonuç olarak; Çeşitli ana bilim dallarının sahip oldukları ekolojik ayak izi farkındalıkları karşılaştırılarak çevreye bakış açısında ana bilim dallarına ait benzer ve farklılıkların düşünülmesi üzerine literatüre katkı sağlayacağı düşünülmektedir. Fen Bilgisi Eğitimi ve Sınıf Eğitimi Ana Bilim Dallarının diğer ana bilim dallarına nazaran daha yüksek ekolojik ayak izi farkındalığına sahip olmalarında öğretim program ve müfredatlarında çevreye yönelik konu ve kazanımların ağırlığının yanı sıra öğretmen adaylarının bireysel özelliklerinin ve bulunduğu çevrenin etkili olabileceği söylenebilir. Cinsiyet farklılığının da ekolojik ayak izinin azaltılmasına yönelik yapılan bilimsel çalışmalar için de ayrıca üzerinde durulması gereken bir konu olduğu yönünde fikir verebilir. Araştırmada elde edilen bulgular doğrultusunda öneriler sunulmuştur.

1. Lisans öğretim programları ve müfredatında çevreye yönelik konu ve kazanımları içeren zorunlu ders eklenebilir ve çevre uygulamaları yaptırılabilir. Bu sayede tüm alanlarda ekolojik ayak izinin farkında, sorumluluk sahibi bireyler yetiştirilebilir.

2. Ekolojik ayak izi farkındalığını etkileyebileceği düşünülen farklı değişkenlerin (bireysel özellikler, öğrenim gördükleri fakülte vb.) etkisi derinlemesine incelenebilir.

3. Ekolojik ayak izini oluşturan gıda, ulaşım ve barınma, enerji, atıklar ve su tüketimine yönelik bilgi, tutum ve davranışlar ana bilim dalları bazında derinlemesine incelenerek her bir alana mensup bireylerin ayak izinin ne gibi faktörlere göre değişim gösterdiği incelenebilir. Bu doğrultuda ekolojik ayak izini azaltmaya yönelik politikalar geliştirilebilir. Bu sayede gıda tüketiminde, ulaşım ve barınmada, enerji kullanımında, atık yönetiminde ve su tüketiminde olumlu yönde davranış değişimleri sağlanabilir.

4. Ekolojik ayak izini oluşturan gıda, ulaşım ve barınma, enerji, atıklar ve su tüketimine yönelik bilgi, tutum ve davranışlar cinsiyet bazında derinlemesine incelenerek ne gibi faktörlere göre değişim gösterdiği incelenebilir. Bu doğrultuda geliştirilecek politikalar sayesinde ekolojik ayak izi azaltılabilir.

5. Daha büyük ve farklı örneklemlerle ekolojik ayak izi farkındalığı irdelenebilir.