

Investigation of the Ecological Footprint Awareness Levels of Classroom Teacher Candidates

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Abstract

The aim of this study is to investigate the ecological footprint awareness levels of classroom teacher candidates. Survey model have been used in this research. The study group consists of 349 prospective teachers who were studying in the first, second, third and fourth grade levels of Kastamonu University Faculty of Education classroom education undergraduate program in the spring term of 2018-2019 academic year. Ecological Footprint Awareness Scale was used as data gathering tool. In the analysis of the data, t-test for independent groups and one-way ANOVA were used for multiple comparisons. For the findings of research, ecological footprint awareness of teacher candidates were examined in terms of gender, class level and settlements variables. When the results obtained from this study were examined in general, it was determined that female teacher candidates had higher ecological footprint awareness than male teacher candidates. In addition, it was observed that pre-service teachers in the fourth grade had higher ecological footprint awareness than pre-service teachers who were at the other grade levels. However, it has been found that the pre-service teachers, who have been living in the city, have higher ecological footprint awareness than the pre-service teachers, who have been living in the village.

Keywords: Classroom teacher candidates, ecological footprint, environment.

Introduction

It is a known fact that the world's population has reached its highest level from the past to the present in the 21st century. However, it is seen that the industrial, science and technology activities developed in the world that we have lived in the last 200 years have reached the most advanced level. It is known that all living populations on earth have a carrying capacity, if the world we live in is accepted as a general population, it can be thought that the world has a carrying capacity. All living and inanimate beings on Earth can be considered as elements of this population. In order for the life to continue on Earth, all natural and artificial resources on the earth must be sufficient for all living things. Otherwise, diminishing living resources will affect life negatively and the world will become increasingly uninhabitable.

Nowadays, rapidly raising population, growth industrialization, distorted or regular urbanization have started to force the carrying capacity of the natural environment. The non-renewable resources have been exhausted rapidly, adversities and problems concerning the future of human beings have gradually increased. Unless there is a change in habitual production and consumption habits, there will be no world for future generations to live on. Therefore, it has become a necessity to understand that natural resources are not unlimited and to prefer nature/environment friendly technologies and behaviors instead of the usual production-consumption habits.

In the environment in which human beings live, organisms are affected by their inanimate environment and affect their existence and inanimate environment. But among all living things, people are undoubtedly the most influential in the environment.

Therefore, human beings have the responsibility of changing the living-inanimate environment very rapidly and irregularly (Kışlalıoğlu & Berkes, 1990).

It is not possible to provide human welfare and happiness by consuming more and having more. For this reason, people need to keep their consumption level at a level to allocate a share to those who live today and to live in the future and learn to be happy and peaceful with these attitudes. The only way that all living things can survive in the future is this understanding of life. From this goal, it is to look for a new order of sharing and living. To achieve this, the goal should be sustainable living. Preserving the existence and health of all living things on the biosphere is a sustainable living condition (Karaca, 1998).

Another important concept that emerged with the concept of sustainability is the concept of ecological footprint. Ecological footprint is defined as the amount of land required to support the consumption of a given population indefinitely. This concept was developed by William Rees and Mathis Wackernagel (Bicknell, Ball, Cullen & Bigsby, 1997). The ecological footprint has emerged as an innovative technique for measuring the ecological dimension of sustainability (Barrett, 2000). Ecological footprint is a heuristic tool commonly used in sustainability analyzes (Venetoulis, 2001). Ecological footprint is one of the methods that demonstrate sustainable development to some extent (Du, Zhang, Song, & Wen, 2006). Ecological footprint is a concept that shows which natural resources are used to what extent human activities are used and how much natural production area is required for each. It is calculated in the simplest form with the following formula (Çelik-Coşkun & Sarıkaya, 2014).

Ecological footprint = Consumption x Required production area

With the ecological footprint calculation, it is possible to measure the land and sea area needed to regenerate the natural resources consumed by a human being. For example, how much grain should be cultivated for 120 kilograms of bread to be eaten by a person who consumes one bread (300 g) a day? How much cotton should be planted in the field for the cotton which is in their clothes? How much area is obtained the water which is they drink? How much agricultural land should be allocated for the tomatoes in the salad? How much vegetation and forest are needed for the oxygen it takes every time him/her draw air into him/her lungs? How much space is used for him/her disposal. Briefly, what is the average total cost of a person to the world where all these vital needs are provided? The answer to this question is hidden in the ecological footprint of individuals (Çelik-Coşkun & Sarıkaya, 2014). Figure 1 provides a visual representation of the ecological footprint of humanity and the biological capacity of the world.

Number of Planet Earths

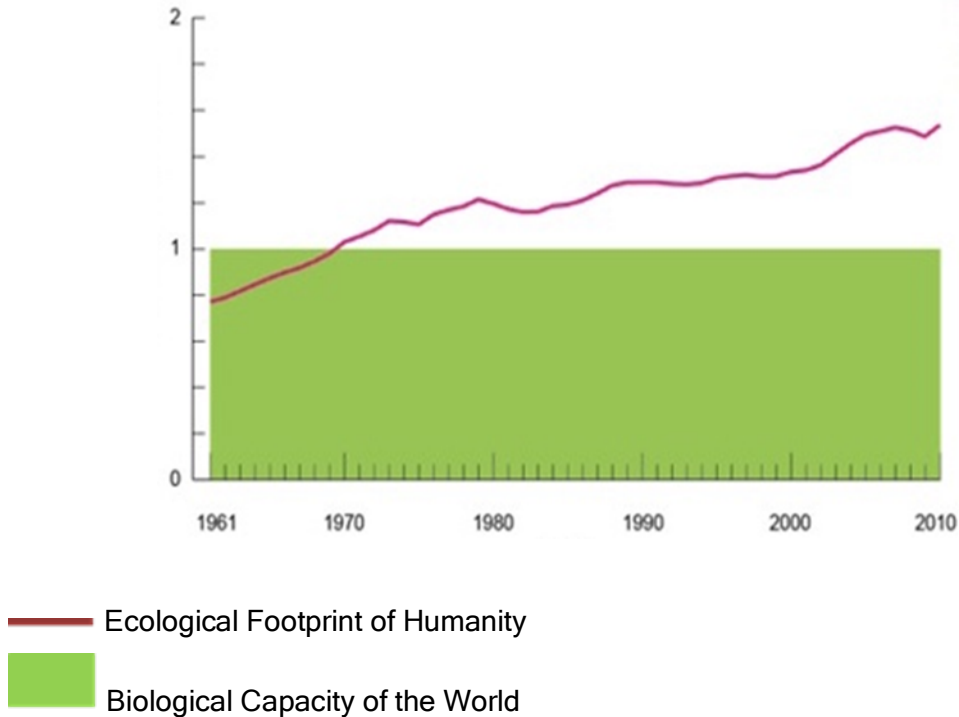


Figure 1. Ecological Footprint of Humanity and Biological Capacity of the World (Living Planet Report, 2014: 10)

Figure 1 shows that while the ecological footprint of humanity can be met by the world's biological capacity around 1960-1970, it is seen that since the 1980s, people's ecological footprint exceeds the world's biological capacity. This situation shows an increase at an even more advanced level as it approaches today. It is possible to say that if the necessary precautions are not taken, the biological capacity of the world will decrease rapidly and many negative situations may occur.

Ecological footprint, which is one of the indicators of sustainable life, is a quantitative expression of the negative effects we have left on the world. Ecological footprint is a more effective educational tool than didactic knowledge in order to change our attitudes and behaviors towards the environment in a positive way. In order to use this tool effectively in education, teacher candidates, who are one of the most important elements of the education process, should have detailed knowledge about this concept and calculate the size of their ecological footprints (Keleş, Uzun & Özsoy, 2008).

As in all aspects of education, factors which were caused by teachers are very important in raising awareness of ecological footprints. Because teachers have the responsibility to create behaviors in the desired direction and successfully in line with the objectives and gains determined in the education system (Kurt, 2013). Especially, classroom teachers are one of the environmental factors that influence and guide all developmental stages of children. In this context, in order to educate individuals who are conscious about the environment, aware of the ecological balance, prioritizing sustainable development and learning to keep the ecological footprint small, the classroom teachers should have firstly this awareness. It is important that prospective classroom teachers are aware of the ecological footprint concept. However, it is very important for them to move towards reducing their ecological footprints and to educate their students in this way (Çelik-Coşkun & Sarıkaya, 2014). In this context, it was

thought that such research should be conducted in order to examine the ecological footprint awareness of prospective teachers.

When the related literature was examined, it was found that there were few studies examining the ecological footprint awareness levels of prospective classroom teachers. In this respect, it is thought that this study is to contribute to the filling of the gap in the related literature. In this study, it is aimed to examine the ecological footprint awareness levels of prospective classroom teachers who are studying at different grade levels. To achieve this goal, the following sub-problems were sought:

1. What are the ecological footprint awareness levels of the classroom teacher candidates at different grade levels?
2. Do the ecological footprint awareness levels of classroom teacher candidates show a significant difference according to variable of gender?
3. Do the ecological footprint awareness levels of classroom teacher candidates show a significant difference according to the variable of grade level?
4. Do the ecological footprint awareness levels of classroom teacher candidates show a significant difference according to the variable of settlement where they lived for the longest time?

Methodology

The survey model which is one of the quantitative research methods have been used in this study. Survey model can be used to determine the views of the participants about a topic or event, or the interest, skill, ability, attitude, etc. The characteristics of which are determined, usually compared to other studies are called on the research on relatively larger samples (Fraenkel & Wallen, 2006). The variables of the research are determined that gender, grade level and the longest lived settlement.

Working Group

The working group of the study consists of all students studying in the undergraduate program of Classroom Education in Kastamonu University Faculty of Education in the spring term of 2018-2019 academic year. Accordingly, the study group consisted of a total of 349 prospective teachers and these are studying in the first year (84), in the second year (82), in the third year (87) and in the fourth year (96). 254 of the participants in the study group were female and 95 were male teacher candidates. Descriptive statistics of the participants of the study group are shown in Table 1.

Table 1.

Descriptive statistics related to the working group

<i>Grade Level</i>	<i>Female</i>		<i>Male</i>		<i>Total</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
First	60	71	24	29	84	100
Second	61	74	21	26	82	100
Third	69	79	18	21	87	100
Fourth	64	67	32	33	96	100
Total	254	73	95	27	349	100

When Table 1 is examined, it is seen that 73% of the study group is female teacher candidates and 27% is male teacher candidates.

Gathering Data

“Ecological Footprint Awareness Scale” developed by Coşkun (2013) was used as data gathering tool in the research. The scale developed in five likert type consists of two parts. The first part of the scale includes demographic characteristics. In the second part, there are 46 items to determine the level of ecological footprint awareness. As a result of the analyzes, 46 items were distributed to 5 different sub-dimensions. These sub-dimensions were named as Energy, Wastes, Food, Water Consumption and Transportation-Housing. KMO value of the scale was calculated as 0.86. The Cronbach's alpha reliability value of the scale was calculated as 0.79 for this study. In the 5-point likert scale with 46 items in total, the most negative answer was coded as “1” and the most positive answer was coded as “5”. Accordingly, the highest score that can be obtained from the scale was evaluated as “230” and the lowest score was evaluated as “46”.

Analyzing Data

In the research, SPSS 21.0 statistical package program was used to analyze the data. Arithmetic mean, standard deviation, t-test for independent groups and one way ANOVA statistical techniques were used in the analysis of the data. In independent t-test and analysis of variance, “p” significance level was evaluated as $*p < .01$.

Findings

Findings Related to First Sub-Problem

What are the ecological footprint awareness levels of the classroom teacher candidates at different grade levels? Ecological footprint awareness status of prospective classroom teachers were examined via using ecological footprint awareness scale. Accordingly, the findings of the related sub-problem are given in Table 2.

Table 2.

Ecological footprint awareness scale average scores of prospective classroom teachers at different grade levels

<i>Grade Level</i>	<i>N</i>	<i>M</i>	<i>SD</i>
First	84	163.32	18.65
Second	82	162.98	22.26
Third	87	163.45	19.17
Fourth	96	171.12	19.66

When Table 2 is examined, it is seen that the highest score ($M= 171.12$) from the ecological footprint awareness scale is obtained by the prospective teachers in the fourth grade. In addition, the lowest score ($M= 162.98$) from the ecological footprint awareness scale is obtained by the prospective teachers in second grade. The reciprocal view of the ecological footprint awareness scale scores of prospective teachers, who are studying at different grade levels, is shown in Figure 1.

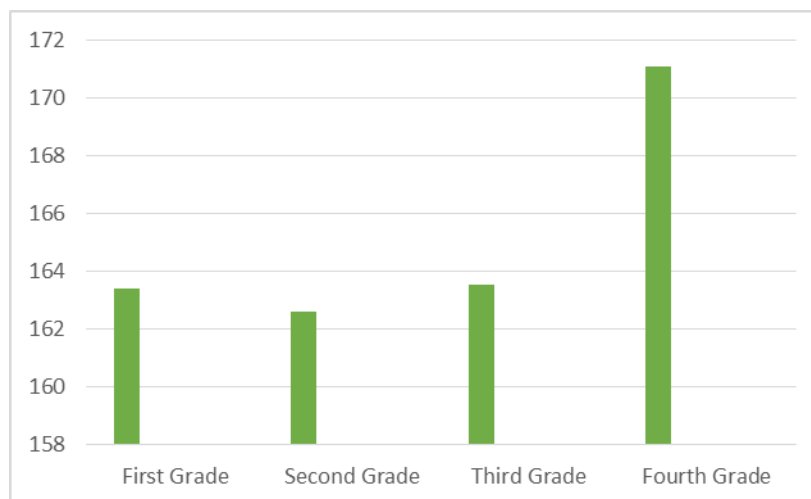


Figure 1. Reciprocal view of ecological footprint scale scores of prospective teachers at different grade levels

Figure 1 shows that the average scores of ecological footprint awareness scale of the prospective classroom teachers who are studying at different grade levels. According to this, it can be said that the teacher candidates, who are studying in the fourth grade, got the highest score from the scale. This finding can be interpreted as the fourth graders have been highest level of ecological footprint awareness among other prospective teachers.

Findings Related to Second Sub-Problem

Do the ecological footprint awareness levels of classroom teacher candidates show a significant difference according to variable of gender? In line with this sub-problem, it was investigated whether the ecological footprint awareness of the prospective classroom teachers showed a significant difference according to the gender variable. The findings of the related sub-problem are shown in Table 3.

Table 3.

Independent t-test results of classroom teacher candidates' ecological footprint awareness scale scores according to gender variable

Gender	N	M	SD	df	t	p
Female	254	166.22	5.63	347	3.821	.000*
Male	95	163.14	6.92			

According to Table 3, prospective teachers' scores, which was obtained from ecological footprint awareness scale, showed that a significant difference according to gender variable ($t_{(347)} = 3,821$; $p < .01$).

When the average scores are examined, it is seen that the average score of female teacher candidates is $M = 166.22$ and the average score of male teacher candidates is $M = 163.14$. According to this, it was concluded that the significant difference determined was in favor of female teacher candidates. This finding can be interpreted as the ecological footprint awareness level of female teacher candidates is higher than male teacher candidates.

Findings Related to Third Sub-Problem

Do the ecological footprint awareness levels of classroom teacher candidates show a significant difference according to the variable of grade level? Within the scope of this sub-problem, it was examined whether the pre-service teachers' ecological footprint awareness showed a significant difference according to the grade level variable. Findings related to this sub-problem are given in Table 4.

Table 4.

ANOVA results of classroom teacher candidates' ecological footprint awareness scale scores according to grade level variable

<i>Source of Variance</i>	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>p</i>	<i>Significant Difference</i>
Between groups	19986.291	3	6662.097	186.295	.000*	4-1, 4-2, 4-3
Within groups	12337.622	345	35.761			
Total	32323.913	348				

1= First grade level

2= Second grade level

3= Third grade level

4= Fourth grade level

When Table 4 is examined, it is seen that the ecological footprint awareness of classroom teacher candidates shows a significant difference according to the grade level variable $F(3, 345) = 186.295, p < .01$.

The Dunnett's T3 test was used to determine which classes in favor of the significant difference between grade levels. According to this, there is a significant difference between the prospective teachers who are studying in the fourth grade and the prospective teachers who are studying in the first, second and third graders in favor of fourth graders (4-1, 4-2, 4-3).

Findings Related to Fourth Sub-Problem

Do the ecological footprint awareness levels of prospective classroom teachers show a significant difference according to the variable of settlement where they lived for the longest time? In line with this sub-problem, it has been investigated whether there is a significant effect of the variable of the settlement where the preservice teachers have lived for the longest time on their ecological footprint awareness levels. The findings related to this sub-problem are shown in Table 5.

Table 5.

ANOVA results of classroom teacher candidates' ecological footprint awareness scale scores according to settlement variable

<i>Source of Variance</i>	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>p</i>	<i>Significant Difference</i>
Between groups	16144.178	3	5381.392	177.791	.000*	3-1
Within groups	10442.481	345	30.268			
Total	26586.659	348				

1= Village

2= District

3= City

When Table 5 is examined, it is seen that the ecological footprint awareness of classroom teacher candidates shows a significant difference according to the settlement variable $F(3, 345) = 177.791, p < .01$.

Dunnett's T3 test was used to determine which settlement favored the difference between the inhabited settlements. According to this, there is a significant difference between the ecological footprint awareness levels of prospective teachers, who are living in the city and prospective teachers, who are living in the village, in favor of living in the city (3-1).

Results and Discussion

Ecological footprint awareness of prospective classroom teachers was examined in this study. In this context, ecological footprint scale was applied to prospective teachers, who are studying at the first, second, third and fourth grade levels of the undergraduate classroom education program. The ecological footprint awareness of prospective teachers were examined in terms of gender, class level and settlement variables.

As a result of the analysis, it was determined that the ecological footprint awareness of the teacher candidates showed a significant difference according to gender variable. When the average scores obtained from the scale were examined, it was found that the difference was in favor of female teacher candidates. This result is similar to the research of Keleş (2011); Coşkun (2013); Yıldız (2014) and Günel (2018) in the related literature. On the other hand, Sivrikaya (2018) concluded that there was no significant difference according to gender variable in the study. In addition, Özgen & Demirci-Aksoy (2017) and Eren, Aygün, Chabanov & Akman (2016) concluded that men's ecological footprint awareness is more advanced than women. The results of this study differ to the studies of Eren, Aygün, Chabanov & Akman (2016); Özgen & Demirci-Aksoy (2017) and Sivrikaya (2018) in the related literature according to gender variable.

In this study, there is a significant difference between male and female teacher candidates in favor of female teacher candidates according to gender variable. It can be interpreted that female teacher candidates give more importance to environment, nature and daily work than male teacher candidates. The fact that female teacher candidates are more involved in household chores may have had an impact on this result.

When the average scores of the ecological footprint awareness scale were compared according to the grade level variable of the preservice teachers, it was found that there was no significant difference between the mean scores of the pre-service teachers in the first, second and third graders. On the other hand, the difference between the average score of the prospective teachers in the fourth grade and the scores of the prospective teachers in the first, second and third grade was found to be statistically significant in favor of the prospective teachers in the fourth grade. But Sivrikaya (2018) found in his study that the grade level variable had no significant effect on the ecological footprint awareness level. In this study, it can be thought that the high level of ecological footprint awareness levels of the prospective teachers in the fourth grade is due to the environmental education course in fourth grade in the undergraduate classroom education program. In addition, it may be thought that the fact that they are more aware of the environment and nature is more effective than the first years of education in university life.

Another sub-problem of the study, pre-service teachers' ecological footprint awareness levels were examined according to the settlement variable. According to this, ecological footprint awareness levels of pre-service teachers were determined in terms of village, district and city variables. Result of the analyzes, it was found that the pre-service teachers living in the city settlements had higher ecological footprint awareness than the pre-service teachers living in the village. This result is similar to Coşkun's (2013) research results in the related literature. In contrast, Yıldız (2014) and Sivrikaya (2018) found that there was no significant difference between ecological footprint awareness levels in terms of settlement variable. In this study, higher level of ecological footprint awareness of prospective teachers living in the city compared to prospective teachers living in the village may be due to their being more careful and sensitive in the city center regarding environment and nature. However, they may necessarily have adopted a lifestyle to reduce their ecological footprint due to the life is more expensive in the city center.

When the results obtained from this study were examined in general, it was determined that female teacher candidates had higher ecological footprint awareness than male teacher candidates. In addition, it has been observed that pre-service teachers, who have been in the fourth grade, have higher ecological footprint awareness than pre-service teachers who have been at the other grade levels. In addition, it has been found that pre-service teachers who have been living in the city, have higher ecological footprint awareness than pre-service teachers who have been living in the village.

In line with these results, it is considered that the results obtained according to the grade level variable should be considered in academic terms. In the fourth grade, there is a compulsory course called "Environmental Education" in the undergraduate classroom education program. This course provides detailed information on both environmental and natural phenomena and ecological footprint concepts. When the results obtained were examined, it was found that the average scores of ecological footprint awareness scale were low and very close to each other in the first, second and third grade levels. But, there was a significant difference in the average scores in the fourth grade. It is believed that one of the most important reasons for this difference is the "Environmental Education" course taken in the fourth grade. In fact, Milton, Cleveland & Bennett-Gates (1995) stated that environmental education course provides an increase in awareness about environmental events and provides the necessary behaviors for the solution of environmental problems. Uyanık (2016) also stated that environmental responsibilities such as environmental education and the educators who give this course have important responsibilities in order to eliminate the negative effects of environmental problems. In this sense, the derivative of the "Environmental Education" course can be added to each grade level as compulsory or

elective courses. It can be ensured that environmental education courses are given by experts who are experts in their fields. Based on the results obtained from this research, it may be considered that "Environmental Education" course should be added to other undergraduate programs of education faculties as compulsory or elective courses. In this way, it can be ensured that preservice teachers in all branches are more responsible and attentive in their behaviors towards the environment and nature. Pre-service teachers can contribute to better protection of the environment by presenting positive exemplary behaviors to the people around them and especially their students when they begin their career as teachers. For this reason, it is very important that prospective teachers' ecological footprint awareness is advanced in order to be role-models for future generations.

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Sınıf Öğretmeni Adaylarının Ekolojik Ayak İzi Farkındalık Düzeylerinin İncelenmesi

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Özet

Bu araştırmanın amacı, sınıf öğretmeni adaylarının ekolojik ayak izi farkındalık düzeylerinin incelenmesidir. Araştırmada tarama modeli kullanılmıştır. Araştırmanın çalışma grubu, 2018-2019 akademik yılı bahar döneminde Kastamonu Üniversitesi Eğitim Fakültesi Sınıf Eğitimi lisans programında birinci, ikinci, üçüncü ve dördüncü sınıf düzeylerinde öğrenim görmekte olan toplam 349 öğretmen adayından oluşmaktadır. Veri toplama aracı olarak "Ekolojik Ayak İzi Farkındalık Ölçeği" kullanılmıştır. Verilerin analizinde SPSS 21.0 istatistik paket programından yararlanılmıştır. Araştırmanın bulgularına göre, kadın ve erkek öğretmen adaylarının ekolojik ayak izi farkındalık düzeyleri arasında kadın öğretmen adayları lehine istatistiksel olarak anlamlı bir farkın olduğu belirlenmiştir. Bununla birlikte, birinci, ikinci, üçüncü ve dördüncü sınıf seviyelerinde öğrenim görmekte olan öğretmen adaylarının ekolojik ayak izi farkındalık düzeyleri arasında da dördüncü sınıftaki öğretmen adayları lehine istatistiksel olarak anlamlı bir farkın olduğu tespit edilmiştir. Ayrıca, en uzun süre yaşanan yer değişkeni bakımından öğretmen adaylarının ekolojik ayak izi farkındalıkları incelenmiş ve buna göre, en uzun süre şehirde yaşayan öğretmen adayları ile en uzun süre köyde yaşayan öğretmen adayları arasında şehirde yaşayan öğretmen adaylarının lehine istatistiksel olarak anlamlı bir farkın olduğu sonucuna ulaşılmıştır. Bu sonuçlardan hareketle, sınıf eğitimi lisans programında araştırmanın yapıldığı yıl itibariyle dördüncü sınıfta zorunlu ders olarak görülen çevre eğitimi dersinin, öğretmen adaylarının ekolojik ayak izi farkındalık düzeylerinin artmasında etkili olduğu düşünülebilir. Buradan hareketle, çevre ile ilgili derslerin eğitim fakültelerinin diğer bölümlerinde de açılmasının, geleceğimizi inşa edecek olan öğretmen adaylarının ekolojik ayak izi farkındalıklarının artmasına katkı sağlayacak olması bakımından önemli olduğu düşünülmektedir.

Anahtar Kelimeler: Çevre, ekolojik ayak izi, sınıf öğretmeni adayları.