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RESEARCH ARTICLE

ECOLOGICAL FOOTPRINT CONCEPT: A CASE STUDY FROM ANADOLU UNIVERSITY

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ABSTRACT

Quantifying the impact of humans on the environment is very difficult due to its complex nature. An ecological footprint is an effective tool and indicator that quantitatively reveals the impact of human beings on the world while maintaining their vital activities, the cost of living or their burden on nature. In this study, the ecological footprints of 179 teacher candidates studying at Anadolu University Faculty of Education were determined by using an international scale. 34.1% of teacher candidates were in the department of primary school education, 35.2% in the department of pre-school education and 30.7% in the department of special education. The ecological footprint results were given in the categories of date, necessary world, land type, consumption categories, ecological footprint, a carbon footprint and percentage effect of carbon footprint on ecological footprint. According to the results, no significant difference was found between the ecological footprints of teacher candidates based on department and gender (except services footprint). However, the ecological footprint values of the teacher candidates were above the average of Türkiye ($p<0.05$). Since teachers, who are one of the most important elements of education, have a great responsibility in raising individuals/society who are conscious and sensitive to environmental problems, teacher education on this issue is very important. It is believed that this study will contribute to the studies to be carried out on the subject.

Keywords: Ecological footprint, Teacher candidates, Anadolu University, Türkiye

1. INTRODUCTION

With the rapid increase in the world population and industrialization, the demand for natural resources and the increase in pressure on these resources have revealed the necessity of questioning the continuity of wealth and production-consumption activities on a global scale. In this context, the concept of sustainable development, which is a multidimensional concept that combines economic, social and environmental elements, has been put forward in order to ensure the continuity of the development of societies [1]. However, in the last period, the emphasis on the concept of ecological sustainability has increased, along with sustainable development, due to the pressure placed on the planet by industrialization and the increasing population, and human beings consuming more than they produce.

Meeting the needs of the present without compromising the capacity of future generations to meet their needs is defined as ecological sustainability [2]. The understanding of the limitations of natural resources has led to an increase in the sensitivity of societies and scientists to the environment. Due to the complex nature of human and environmental relations, it is very difficult to quantify the impact on a global, country, institutional and even personal scale. In order to overcome this difficulty and to determine ecological sustainability quantitatively, Wackernagel and Rees [3] first introduced the concept of ecological footprint in 1996.

The ecological footprint is an indicator that quantitatively reveals the impact of human beings on the world while maintaining their vital activities, the cost of living or their burden on nature [4]. The main emphasis in the concept of ecological footprint is that for the sustainability of life, individuals should

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organize their living conditions and economic activities by taking into account the carrying capacity of the planet. Ecological footprint, which is on an international scale, consists of built-up land, forest products, cropland, grazing land, fishing ground and carbon footprint components in terms of land types. When considered on an individual basis, the effects on nature during a person's vital activities are calculated on the basis of these components and the results are given in terms of global hectares. The global hectare area represents the productive capacity of 1 hectare of land over the world's average productivity [2]. Then, using these values, the global hectares corresponding to the consumption categories of the person including food, shelter, transportation, goods and services and finally the ecological footprint are calculated. In short, a metric of sustainability, the ecological footprint transforms consumption and waste generation into units of the equal land area [5]. An exciting way to make society aware of some of the less obvious but essential aspects of human ecology and to familiarize people with some of the environmental effects of a consumer society is through ecological footprinting. Since the calculation of the ecological footprint reveals how, by whom, and to what extent natural resources are used, making these calculations is very important in creating the balance of use of natural resources [6].

Another concept that should be considered together with the ecological footprint is the concept of biocapacity. Biocapacity is defined as the supply of natural resources and ecological services. In other words, it is the quantity of productive areas used in the world to produce natural resources. By comparing the ecological footprint and biocapacity values, the minimum sustainability criterion is defined. Accordingly, in order to ensure sustainability, the total ecological footprint should be less than the total biological capacity [7]. When the ecological footprint is greater than the total biocapacity, a biocapacity deficit arises [8-10].

Ecological footprints, biocapacities and related values of countries are reported in studies carried out periodically based on all countries around the world. Türkiye's Ecological Footprint Report prepared by World Wildlife Fund in 2012 is one of them [2]. According to the report, Türkiye's ecological footprint is 50% above its global biocapacity. In other words, Türkiye needs 1.5 planets to continue in this way and this situation is not sustainable for our country. It is predicted that the gap between biocapacity and ecological footprint will continue to increase in favor of ecological footprint and this situation will continue to be a problem in the future [2, 11]. Clearly, efforts are needed in this regard.

In Türkiye, as in the world, the largest of the ecological footprint components is personal consumption with a rate of 82% [2]. Therefore, it is extremely important to determine the ecological footprint values on an individual basis and to raise awareness. For this reason, it is seen that studies on ecological footprints have increased in Türkiye, especially since the beginning of the 2000s [12-22].

Although there is the potential use of communication tools such as TV programs, social media, etc. to raise awareness on the ecological footprint on an individual basis, their effectiveness of them is often controversial [23]. In this sense, getting effective results can only be possible with the total education of society. Teachers, who are one of the most important elements of education, have a great responsibility in raising individuals who are conscious and sensitive to environmental problems [24]. In order for teachers to be sufficient in this regard, they must complete their education with the necessary equipment. For this, the concept of ecological footprint firstly needs to be learned by teacher candidates before they start teaching [1]. It has been demonstrated by research that tools such as the ecological footprint calculation tool will be used in teacher education and that it will be effective in increasing sustainability by raising more sensitive and conscious individuals towards the environment [25]. Few research, however, have examined the relationship between environmental footprint assessment and the value of education for national sustainability in Türkiye [26-35].

Therefore, this study aims to determine the ecological footprints of teacher candidates in different branches based on various variables and to raise awareness about this subject in teacher candidates,

based on the belief that the first group to have knowledge about sustainable development should be teacher/teacher candidates.

2. MATERIALS AND METHODS

2.1. Research Group

179 teacher candidates studying at Anadolu University Faculty of Education participated in the research during the spring term of 2021-2022. When the distribution of teacher candidates according to their gender, it could be seen that 67.6% of them were female and 32.4% of them were male students. 34.1% of teacher candidates studied in the department of primary school education, 35.2% in the department of pre-school education and 30.7% in the department of special education. Information about the research group was summarized in Table 1.

Table 1. Distribution of the research group according to some variables

Department	Gender	Frequency	%
Primary School Education	Male	22	12.3
	Female	39	21.8
Pre-school Education	Male	12	6.7
	Female	51	28.5
Special Education	Male	24	13.4
	Female	31	17.3
	TOTAL	**179**	**100**

2.2. Data Collection and Tools

There are many scales used to calculate the ecological footprint of individuals. In this study, the "Ecological Footprint Scale", a web-based scale with international standards, was used (http://www.footprintcalculator.org/). The scale consists of 16 questions in total. Two of the questions are related to food, six of them are related to shelter, 1 of them are related to goods/services and 7 of them are related to transportation components. The questions in the questionnaire were adapted to Turkish and applied to the participants in the spring term of 2021-2022 in a digital environment. Then, the answers of the participants who answered the scale to questions were entered into the system. When the data is entered into the system, the system calculates and summarizes the ecological footprints of the participants in the date, necessary world, land type, consumption categories, ecological footprint, carbon footprint and percentage effect of the carbon footprint on the ecological footprint, with the algorithm it contains. Thus, based on the automatic calculation of the program, it provides an idea about the consumption patterns of each participant who answered the survey, and due to the comprehensible nature of the data, awareness is created on the subject. Values related to the ecological footprint and its components obtained from the answers given by the participants to the questions were expressed in global hectares (gha).

In addition, through a personal information form developed, the participants were asked whether they had heard of the concept of ecological footprint before, if they had knowledge, whether they consciously applied the principles of ecological footprint in their daily lives and other thoughts they wanted to express, in addition to questions about gender and branch. All the answers given by the participants were recorded and then statistical evaluations were made.

2.3. Data Analyses

When the literature was examined, it was seen that studies on the subject do not include data and comparisons related to the sub-variables of the land type category, which is one of the ecological

footprint components, and comparisons were made mainly based on the values in the consumption category (food, shelter, transportation, goods and services) [1, 26-35]. For this reason, the data related to the land type variable were given over the average values, and the other data were compared statistically.

In this context, firstly, the data were examined in terms of normal distribution, later, ln transformation was applied to the world necessary, food, shelter, transportation and carbon footprint values that were determined not to show normal distribution, and log10 transformation was applied to the ecological footprint data. Analyzes were performed by using these transformed data.

In the evaluations of gender variables, independent samples t-test was used. For branch variable, One-way ANOVA analysis was used and for comparison of the data with Türkiye's average, one sample t test was used. The data were analyzed using the SPSS 21.0 program.

3. RESULTS AND DISCUSSIONS

3.1. Date Data

In the ecological footprint scale, the first value given as a result of entering the data on an individual basis and calculating the ecological footprint value is the "date" data. Date data, based on the calculated footprint value, defines the date when the person consumed all of the world's resources for his/her share for that year. This is very important data in terms of raising awareness about the ecological footprint. Table 2 summarises the average date data of the participants in this study. When Table 2 is evaluated, it is seen that, on average, as of 28 May, teacher candidates used their share of the world resources of that year, and in the following part of the year, they used resources that did not belong to them, and thus a biocapacity deficit emerged. On the basis of gender, it is observed that the critical date for men is 23 May, while for women it is 30 May. It is seen that female teacher candidates of the special education department have the best value in this sense (4 Jun), while male teacher candidates of the primary school teaching department have the worst value (24 May). However, it is a remarkable result that all teacher candidates consume their share of the world's resources before almost half of the year is over. It is desirable that this date falls as far as possible at the end of the year or even on 31 December [2]. In other studies, conducted in our country, no study evaluating ecological footprint and date data together has been found [26-35].

Table 2. Average date data of participants by departments and gender

Department	Gender	Date	Average
Primary School Education	Male	24 May	25 May
	Female	25 May	
Pre-school Education	Male	4 May	26 May
	Female	31 May	
Special Education	Male	31 May	3 June
	Female	4 June	
TOTAL	Male	23 May	28 May
	Female	30 May	

3.2. World Necessary

In the ecological footprint scale, the second value given is the "world necessary" data. The necessary world data of an individual is a data that defines how many worlds are needed if everyone in the world lives like that individual. This is also very important data in terms of raising awareness about the ecological footprint. The expected situation is that the load that everyone creates on the earth during their vital activities is equivalent to 1 earth at most [2]. Table 3 summarises the average necessary world

data of the participants in this study. When Table 3 is analysed, it is seen that the average number of required worlds of all participants in the study is 2.62. When the required world data is analysed by the department, it is seen that primary school teacher candidates have the highest value with 2.72 while special education teacher candidates have the lowest value with 2.49. When compared in terms of gender variable, it is seen that male teacher candidates in the department of pre-school education have the highest value (3.03) and female teacher candidates in the department of special education have the lowest value (2.47). When all teacher candidates are compared together in terms of the required world data, it is seen that male teacher candidates have a higher value (2.73) than female teacher candidates (2.57). In all evaluations made on the basis of both departments and gender, it is clear that it is far above the required value (one world).

Table 3. Average world necessary data of participants by departments and gender

Department	Gender	World Necessary	Average
Primary School Education	Male	2,79	2.72
	Female	2,69	
Pre-school Education	Male	3,03	2.63
	Female	2,54	
Special Education	Male	2,52	2.49
	Female	2,47	
TOTAL	Male	2,73	2.62
	Female	2,57	

When evaluated on the basis of departments, it was determined that the difference between departments in terms of the number of world necessary was not statistically significant (F: 1.714, $p>0.05$). Similarly, there is no statistically significant difference on the basis of gender variable (t: 1.478, $p>0.05$).

The last report on Türkiye's ecological footprint was published by WWF in 2012 [2]. According to the report, Türkiye's ecological footprint exceeds the global biocapacity by 50%. In other words, if everyone in the world consumed as much as a citizen of Türkiye, we would need 1.5 planets. The data obtained in this study were compared with this critical number by means of one-sample t test. Accordingly, the number of worlds needed for the consumption of teacher candidates is statistically different from both the average of Türkiye (t: 29.128, $p<0.05$) and the desired average of 1 world (t: 51.506, $p<0.05$). In other studies, conducted in our country, no study evaluating ecological footprint and necessary world data together has been found [26-35].

3.3. Land Types Footprint

In the ecological footprint scale, the third value given is the “land types footprint” data. The land type footprint data gives the size of the different land types required to meet the world resources consumed by an individual in terms of global hectares. It has some subcomponents. Built-up land footprint data refers to the area covered by infrastructure and superstructure to meet human needs, including transport networks, housing, industrial buildings and hydroelectric power plants. Forest products footprint data refers to the area of forest required to produce wood, pulp, timber, industrial wood and firewood for human consumption. Cropland footprint data refers to the agricultural area required for the production of food, fibre, animal feed, oil crops and rubber for human consumption. Grazing land footprint refers to the grazing area required to produce the products people demand, such as meat, milk, leather and wool. Fishing ground footprint refers to the estimated area of marine and freshwater required to sustain the fish and seafood consumed. Carbon footprint refers to the area of forest required to sequester emissions from fossil fuel consumption, land use changes and chemical processes, with the exception of CO_2 emissions sequestered by the oceans [2]. Table 4 summarises the average land type data (gha) of participants by departments and gender in this study. Table 4 shows that cropland has the highest average value (1.13 ± 0.38), while grazing land (0.10 ± 0.04) and fishing ground (0.11 ± 0.06) have the

lowest average values The average value of carbon footprint related to land type was determined as 2.36+0.81.

Table 4. Average land type data (gha) of participants by departments and gender

		Built-Up Land (gha±SD)	**Forest Products** (gha±SD)	**Cropland** (gha±SD)	**Grazing Land** (gha±SD)	**Fishing Ground** (gha±SD)	**Carbon Footprint** (gha±SD)
Primary School Edu.	Male	0.15±0.06	0.46±0.13	1.07±0.36	0.10±0.04	0.11±0.05	2.54±1.04
	Female	0.15±0.05	0.45±0.11	1.05±0.32	0.1±0.03	0.1±0.06	2.37±0.74
Pre-school Edu.	Male	0.18±0.05	0.48±0.09	1.38±0.48	0.13±0.05	0.15±0.07	2.64±0.78
	Female	0.15±0.05	0.44±0.09	1.07±0.33	0.09±0.04	0.1±0.05	2.27±0.75
Special Edu.	Male	0,15±0.05	0.46±0.14	1.15±0.38	0.1±0.05	0.11±0.05	2.15±0.6
	Female	0.15±0.06	0.45±0.13	1.04±0.4	0.08±0.05	0.1±0.05	2.18±0.78
Average		**0.15±0.06**	**0.46±0.12**	**1.13±0.38**	**0.10±0.04**	**0.11±0.06**	**2.36±0.81**

According to Türkiye's ecological footprint report, 46% (1.24-1.36 gha per capita) of Türkiye's ecological footprint components are carbon footprint, 35% (about 1 gha per capita) agricultural land, 11% (0.29 gha per capita) forest products, 3% (0.05 gha per capita) grassland, 3% (0.08 gha per capita) built-up area and 2% (0.06 gha per capita) fishing ground footprint components [2]. Although the results are proportionally quite similar to this study, the average values are about twice the average per capita footprint components of Türkiye. This is also an important result. Since these data give less insight to ordinary people who are not experts in the field, most articles in Türkiye do not include data on this topic at all [1, 26-35].

3.4. Final Comsumption Categories

In the ecological footprint scale, the fourth value given as is the "consumption categories" data. Consumption categories data is the more visible component of the ecological footprint value. It has some subcomponents such as food, shelter, mobility, goods and services. These values, given in gha, represent the world resources used to meet an individual's needs for food, shelter, transport, goods and services. Table 5 summarises the average consumption categories data (gha) of participants by departments and gender in this study. When Table 5 is analysed, it is seen that teacher candidates received the highest value from the food category in terms of consumption categories, followed by goods, services, shelter and mobility. When the components of Türkiye's ecological footprint by consumption categories according to Türkiye's ecological footprint report are analysed, it is seen that the food category takes the first place with 52% (1.18 gha per capita), followed by products with 21% (0.47 gha per capita), transport with 15%, (0.33 gha per capita) services with 6% (nearly 0.13 gha per capita) and housing with 6% (nearly 0.13 gha per capita) [2]. In this study, the rates are 30% for food (1.28 gha per capita), 22% for goods (0.95 gha per capita), 19% for services (0.8 gha per capita), 16% for shelter (0.68 gha per capita), 13% for transport (0.56 gha per capita). As can be seen, in all items, the footprint values of teacher candidates are higher than Türkiye's average.

When the consumption categories are evaluated on the basis of departments, it is seen that there is no significant difference in terms of food variable (F: 0.52, $p>0.05$), shelter variable (F: 0.147, $p>0.05$), transport variable (F: 1.228, $p>0.05$), goods variable (F: 0.342, $p>0.05$) and services variable (F: 0.543, $p>0.05$). When consumption categories are evaluated on the basis of gender, it is determined that there is no statistically significant difference between food variable (t: 0.192, $p>0.05$), shelter variable (t: -0. 235, $p>0.05$), transport variable (t: 0.192, $p>0.05$) and goods variable (t: 0.214, $p>0.05$) variables. In the services variable, the gender-based difference (male $_{average}$: 0.83 gha, female $_{average}$: 0,77 gha) is statistically significant (t: 2.283, $p<0.05$).

Table 5. Average comsumption categories data (gha) of participants by departments and gender

		Food (gha±SD)	**Shelter** (gha±SD)	**Mobility** (gha±SD)	**Goods** (gha±SD)	**Services** (gha±SD)
Primary School Edu.	Male	1.18±0.61	0.65±0.34	0.77±0.19	0.96±0.45	0.77±0.16
	Female	1.13±0.52	0.60±0.27	0.59±0.1	1.03±0.66	0.79±0.14
Pre-school Edu.	Male	1.70±0.75	0.6±0.44	0.78±0.18	0.93±0.57	0.91±0.14
	Female	1.22±0.54	0.64±0.41	0.5±0.37	0.99±0.48	0.75±0.13
Special Edu.	Male	1.36±0.59	0.82±0.27	0.28±0.08	0.88±0.34	0.81±0.17
	Female	1.11±0.6	0.77±0.40	0.42±0.1	0.90±0.56	0.79±0.16
Average		**1.28±0.6**	**0.68±0.36**	**0.56±0.17**	**0.95±0.51**	**0.80±0.15**

In the study conducted by Özyürek et al. (2022) statistically significant difference was found between departments in the goods and services item, while no difference was observed in other components. In the same study, a difference was determined on the basis of gender only in the shelter item, no difference was determined between the other components [26]. In a study conducted by Keleş and Aydoğdu (2010), similar results were found in terms of consumption categories (1.7 gha for food, 1.03 gha for goods and services, 1.01 gha for shelter and 0.17 for mobility), [33]. In a study conducted by Keleş et al. (2008), a gender-based difference was mentioned only in the food item and no significant difference was found among other items. In this study, pre-service teachers from different branches were studied, but there was no evaluation on the basis of department [35].

3.5. Ecological Footprint and Carbon Footprint

The most important output of the international ecological footprint scale applied in this study is the ecological footprint data. The last data in this scale is the carbon footprint data and the percentage effect of a carbon footprint on ecological footprint value. All data belonging to these three variables are summarized in Table 6. When Table 6 is analysed, it is seen that the highest ecological footprint value is found in male teacher candidates in the department of pre-school education and the lowest value is found in female teacher candidates in the department of special education. The average ecological footprint value of the research group was determined as 4.29 gha. When the carbon footprint values are compared, it is seen that male teacher candidates in the department of pre-school education have the highest value, while male teacher candidates of special education have the lowest value. The average carbon footprint value of the research group was determined as 6.7 tonnes/year. It is seen that the carbon footprint is responsible for 53.9% of the average ecological footprint value.

Table 6. Average ecological and carbon footprint data of participants by departments and gender

		Ecological Footprint (EF) (gha±SD)	**Carbon Footprint (CF)** (ton/per year±SD)	**% CF in EF value** (±SD)
Primary School Edu.	Male	4.40±1.48	7.37±3.05	56.86±6.98
	Female	4.22±1.02	6.88±2.13	55.28±6.40
Pre-school Edu.	Male	4.93±1.06	7.68±2.22	53.25±8.57
	Female	4.13±1.00	6.58±2.13	52.37±11.41
Special Edu.	Male	4.14±0.92	6.25±1.76	51.92±7.60
	Female	4.02±1.17	6.37±2.23	54.29±7.17
Average		**4.29±1.10**	**6.7±2.25**	**53.9±8.63**

The difference in ecological footprint values is not statistically significant for both departments (F: 0.763, $p>0.05$) and gender (t: 1.567, $p>0.05$). However, according to Türkiye's ecological footprint report, Türkiye's estimated ecological footprint size is 3.3 gha for 2023 [2]. The data obtained in this

study were compared with this critical number by means of one-sample t test. Accordingly, the ecological footprints of teacher candidates are significantly different from the expectation of Türkiye's ecological footprint (t: 11.568, $p<0.05$).

In some other studies conducted on pre-service teachers in Türkiye, it was reported that ecological footprint values were above the average of Türkiye [1, 12, 33, 35, 36]. Yıldız and Selvi (2015) found that the average ecological footprint of pre-service science teachers was higher than the average footprint of Türkiye [1]. Keleş et al. (2008) and Keleş and Aydoğdu (2010) determined that the ecological footprint values of teacher candidates in different branches were above the world and Türkiye averages [33, 35]. Ağaç and Yalçın (2018) determined in their study that the average ecological footprint of science teacher candidates among teacher candidates was higher [36]. These findings are similar to the findings of this study.

3.6. Other Informations

In addition to the ecological footprint scale, through a personal information form developed, the participants were asked whether they had heard of the concept of ecological footprint before, if they had knowledge, whether they consciously applied the principles of ecological footprint in their daily lives and other thoughts they wanted to express. It was determined that a total of 89 teacher candidates (primary school 33, pre-school 30, special 26) had heard of the concept of ecological footprint before (49.7%), while the remaining 90 teacher candidates (primary school 28, pre-school 32, special 29) had never heard of it (50.3%). A total of 47 (26.2%) teacher candidates (primary school 14, pre-school 18, special 15) stated that they consciously apply ecological footprint principles in their daily lives, while the rest (73.8%) did not. However, it is seen that the ecological footprints of the teacher candidates who stated that they consciously apply ecological footprints are above the average of Türkiye. In a study conducted by Yıldız and Selvi (2015), it is revealed that even a large proportion (75%) of pre-service science teachers, who are perhaps the group that should have the most knowledge about the subject, have heard the concept of ecological footprint for the first time [1].

When all analyses were evaluated together, it was determined that there was no difference between the ecological footprints of teacher candidates studying in the departments of primary school, pre-school and special education at Anadolu University Faculty of Education on the basis of both department and gender (except services footprint). One of the main reasons for this is thought to be related to Eskişehir province. Most of the students live in what is considered to be a student district in the province, which is very close to the university. They stay in houses with similar characteristics and live in similar conditions. Due to the close location of the university, walking to and from classes reduces the mobility footprint values. However, the intercity routes they make to visit their families increase the mobility footprint. Food constitutes the highest component of the consumption-related footprint of teacher candidates. It is thought that this can be explained by the fact that students who are away from their families mostly consume ready-made food.

In this study, it was determined that the ecological footprint values of teacher candidates on the basis of both department and gender were considerably higher than the average of Türkiye. This situation shows that these teacher candidates, who are educated in different branches, do not have sufficient knowledge in terms of ecological footprint and sustainability concepts. When the relevant departments of Anadolu University Faculty of Education are evaluated in terms of curriculum, it is seen that there is a course called environmental education ("Çevre Eğitimi" in Turkish) only in the department of primary school education. When the course content is examined, it is seen that there is standard information about environmental education, but not specifically about ecological footprint and sustainability. In this context, it is thought that it would be useful to open a course in all departments of education faculties or to make the necessary content updates/improvements in existing courses.

Another advantage of this study is that the interests of teacher candidates in these departments are orientated towards relatively young age groups. Because, as in many subjects, environmental adaptations can be acquired more effectively at early ages.

In our country, the number of studies in which ecological footprint and university students are evaluated together is not very high. While some of these studies used the international ecological footprint scale used in this study [1, 26, 35], many other studies used scales developed by researchers [27, 28, 29, 30]. Due to the different scales used, it is seen that the results and reporting of the results are also different. For this reason, it is seen that the data of some variables such as date, world necessary and land types provided in the international standard ecological footprint scale are not given in other studies. Similarly, it is seen that some data provided in other studies are not provided on an international scale. Of course, the best way is to use a specific scale developed for our country throughout the whole country. In this regard, there are news about the development of a Türkiye-specific ecological footprint calculation tool developed by Keleş and Özsoy and even studies using this scale [37], but it is not widely used. The development of this and similar specialised scales will enable more reliable assessments across the country.

The total ecological footprint of production in Türkiye exceeded the national biological capacity for the first time in 1972, and by 2007, it exceeded the biological capacity by approximately 1.6 doubled (2.1 gha), [2, 8]. It is clear that something must be done about the issue. In many studies, it has been concluded that the use of ecological footprint as an educational tool positively increases the awareness of the individuals participating in the research towards sustainable life, improves their attitudes moderately positively and is effective in gaining responsible behaviors towards sustainable life [37]. Considering that teachers play a key role in the development of value judgements and lifestyles necessary for sustainable development, it is clear that there is a need for training on these issues for teacher candidates in Türkiye. It is believed that this study will raise awareness on this issue and contribute to the studies to be conducted on this subject.

4. CONCLUSIONS

The following suggestions can be made.

- Courses on ecological footprint should be added to the curriculum of teacher candidates or existing course contents should be updated.
- Seminars, symposiums, etc. can be held together with public and non-governmental organisations that raise awareness in the direction of reducing the ecological footprint values of teacher candidates.
- It can be ensured that teacher candidates take part in project studies that will lead to the reduction of ecological footprint values.
- Informative training on ecological footprint can be added to the in-service training programmes of existing teachers.
- In order to increase the level of awareness in the social dimension, ecological footprint practices appropriate to the characteristics of each period should be included in all stages of education, including higher education, starting from pre-school age.

CONFLICT OF INTEREST

The author stated that there are no conflicts of interest regarding the publication of this article.

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