Improving ecological footprint awareness of primary school students

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ABSTRACT

The aim of this study is to improve primary school students' ecological footprint awareness through ecological footprint-based activities. The research was conducted in accordance with the quantitative research method and a quasi-experimental design with pre-post test experimental-control group was used in the research. The criterion sampling method was used to determine the study group for the experimental process, and 26 students (N experimental=13; N control=13) studying in the fourth grade of a public school in the Central Anatolia Region were included in the study. In the study, the Ecological Footprint Awareness Scale was applied as pretest-posttest. The process took place in science classes in both groups. While the courses were curriculum-based in the control group, ecological footprint-based activities were organized in the experimental group. The data were analyzed by analysis of covariance (ANCOVA) and dependent groups t-test, and the effect size ($[\hat{\eta}2]$) was calculated according to the variances. As a result of the research, when the ecological footprint awareness pre-test mean scores of primary school students were controlled, it was concluded that there was a significant difference between the ecological footprint awareness post-test mean scores of primary school students in which the activity process took place, and the ecological footprint awareness post-test mean scores of primary school students in which the activities did not take place. It was evaluated that 45% of the variance related to the post-test mean scores was due to the activity process applied. While teaching courses with ecological footprint-based activities applied in the experimental group significantly increased the mean scores of primary school students' ecological footprint awareness with a medium effect, teaching curriculum-based courses did not significantly increase the mean scores of primary school students' ecological footprint awareness attitude. It should be considered important to present topics such as ecological footprint, carbon footprint or water footprint calculations to students depending on the concept of sustainability to be integrated into primary school curriculum programs and to focus on in-class and out-of-class activities.

Introduction

The frenzy of consumption in the last century has led to a gradual depletion of natural resources, and the wastes generated by consumed products have caused pollution of the environment. This pollution and the resulting destruction have led to the contamination of resources (air, water, soil, etc.) and to various environmental disasters such as extreme temperatures, flash floods and droughts. In addition, the need for food and energy to meet basic needs due to population-based increases has accelerated the production process and led to an even greater consumption of resources (Sulak, 2018). With this acceleration, the production and consumption sector has grown rapidly and the environment has been ignored by consuming natural resources.

Maintaining the balance between production and consumption, preventing waste and reducing consumption are of great importance for the protection of ecological balance. The concept of Ecological Footprint was introduced in order to determine the effects of individuals' living habits on natural resources and to monitor the direction in which the gap between production and consumption evolves. Ecological Footprint is one of the measurement methods that quantitatively shows the negative impacts of individuals on the earth (McNichol et al., 2011; Wackernagel, 2013). Ecological footprint is based on assessing the physical space required to sustain a particular process or economic activity, emphasizing the relationship between resource use and environmental impact (Biekša, 2016). With ecological footprint, it is aimed to determine the surface area of the earth for the production of food, resources, energy, disposal of waste, and reduction of carbon dioxide generated after the use of fossil fuels by photosynthesis (Keleş et al., 2008). In order to measure the effects of human activities on nature, the ecological footprint brings to mind the main problem of sustainable progress, *"how much of nature do we use relative to the nature we have?"* and includes ideas about what can be done next (Bond, 2003). Thus, it starts from the assumption that the Earth has a limited amount of biological production that sustains all life forms and emphasizes the importance of living within the renewal capacity of the planet (Liu et al., 2018). The ecological footprint is defined in "global hectares" (kha) and is calculated with six components (carbon, agriculture, forest, grassland, built-up area and fisheries footprint) (WWF, 2012). The formula is simply calculated as *"Ecological footprint = Required production area x Consumption"*.

The measurement of the land and sea area needed for the reproduction of the natural resource consumed by a person is possible with the ecological footprint calculation. For example, if a person consumes (300 g) of bread daily, this corresponds to a total of 120 kg of bread per year. How much area should be planted for the grain of this bread, how much cotton should be planted for the production of the cotton in the clothes worn, the area from which the drinking water is obtained or how much agricultural land should be allocated for the production of tomatoes in the salad can be calculated with this method (Coşkun & Sarıkaya, 2014). This calculation is used as a tool to estimate the biological capacity required to support the consumption of human resources and waste production in a standardized way (Majid & Zaman, 2018). Thus, the question *"what can I do today to lead a more sustainable lifestyle within the earth's capacity while improving my quality of life?"*, which causes us to question our lives, can be solved by analyzing the ecological footprint (Wilson & Anielski, 2005).

One of the primary steps to be taken to solve the deterioration in the ecological balance and the environmental pollution that occurs with it should be the practices to be carried out for environmental education. The main objectives of environmental education are to increase the sensitivity of individuals to the environment, to ensure the formation of environmental awareness, to develop responsible behavior towards the environment and to create the

environmental ethics necessary for sustainable life. Through hands-on experiences and interdisciplinary approaches, students can actively participate in social-environmental problems in society (Scheie & Stromholt, 2019). Forming this purpose should start at an early age (Blatchford et al., 2010; Edwards, 2005). In this way, it becomes more likely for them to internalize environmental values and apply them in their daily lives (Khumalo, 2019). At this point, the primary school period, where the basic personality traits of the individual are formed, is considered important in terms of environmental education and the acquisition of sustainability values. Because in this period, cognitive, affective and behavioral competencies that will continue throughout life are acquired (Aydın, 2007). The activities to be implemented during this period will help students find solutions to possible ecological crises in the future and enable them to show responsible behavior towards the environment. Especially integrating the concepts used in sustainability education into the curriculum and involving students in practical experiences can play an important role in shaping environmentally sensitive and socially responsible individuals among primary school students. When the relevant literature studies were examined, it was seen that the activities carried out on the basis of ecological footprint from an early age showed significant effects in line with the above-mentioned goals (Güngör & Cevher-Kalburan, 2022; Karakaş et al., 2016; McNichol et al., 2011; Pullu, 2023; Şahin & Karayılan, 2019). From this way, the use of the concept of ecological footprint in the primary school period was considered important by the researchers and used in courses in the context of environmental education. In this study, it was thought that having ecological footprint-based activities with primary school students in the context of environmental education would be significantly effective in developing students' environmental awareness and raising awareness in line with sustainable development goals. It is predicted that with ecological footprint-based activities integrated into the primary school curriculum, primary school students will be able to raise awareness and exhibit behaviors that can reduce their ecological footprint by further reducing their consumption habits. In line with this importance and rationale, the aim of the study was determined as developing primary school students' ecological footprint awareness through ecological footprint-based activities. In line with this purpose, answers to the following sub-problems were sought:

1. When the pre-test means scores of primary school students who participated in ecological footprint-based activities and primary school students who did not participate in this process are controlled, is there a significant difference between their mean scores of ecological footprint awareness?
2. Is there a significant difference between the pretest and posttest ecological footprint awareness mean scores of primary school students who participated in ecological footprint-based activities?
3. Is there a significant difference between the pretest and posttest ecological footprint awareness mean scores of primary school students who did not participate in ecological footprint-based activities?

Method

Research design

The research was conducted in accordance with the quantitative research method and a quasi-experimental design with pre-post test experimental-control group was used in the research. In this design, measurements of the dependent variable for the experimental and control groups are obtained by using the same measurement tools for both pre-test and post-test. The experimental process is applied only to the experimental group (Balcı, 2013; Johnson & Christensen, 2014). The experimental process applied in this study is presented in Figure 1.
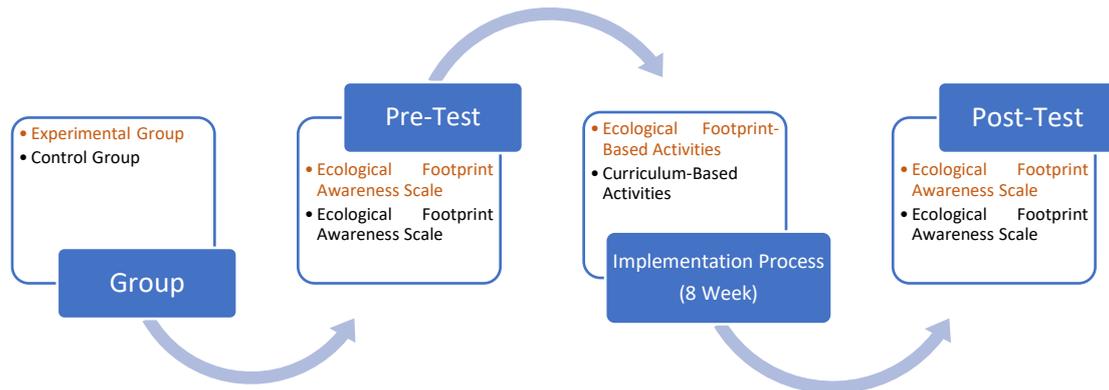
Figure 1 Quasi-experimental design with pretest-posttest experimental-control group

As seen in Figure 1, the Ecological Footprint Awareness Scale was applied to both groups before and after the implementation process in order to test the effect of the experimental process. The implementation process was carried out for 8 weeks in the primary school science course and at the end of the process, the data obtained from the pre and post-tests were analyzed and interpreted.

Research group

Criterion sampling method was used to determine the study group for the experimental process. The criteria used in determining the study group were that the students were taking the science course and that they were capable of learning the concept of ecological footprint more easily. The reason for determining the science course as a criterion is that the course content is suitable for the issues of economical use of resources within the concept of ecological footprint and that this course can be used within the scope of the activities to be carried out. The fourth grade of primary school was determined as a criterion because in the first three years, students' readiness in the subjects related to the concept of ecological footprint is higher with life science and science courses. In this context, a public school with two fourth grade classes in a province in the Central Anatolia Region was identified and 26 fourth grade students were included in the study. According to the pre-test results, it was seen that the branches were identical and according to the principle of randomization, one of the branches was determined as the experimental group and the other as the control group.

Data collection process

The implementation process of the study was carried out in the fourth grade science course in the first semester of the 2023-2024 academic year. The control group was conducted with primary school fourth grade students based on the Science Curriculum (MoNE, 2018). This process was carried out by the researchers on the basis of the textbook defined as traditional. Conducting the courses with traditional teaching is a form of practice in which methods such as lecture, question-answer and discussion are emphasized under the leadership of the teacher, the course process is directed by the teacher, and the textbook is taken as the main source (Gürses, 2010). However, in recent years, especially with the radical changes made by the Ministry of National Education in the curriculum in 2005, directing students to research and inquiry has emerged as a method frequently used by teachers. However, in the control group, the researchers structured the science course topics with traditional teaching as stated by Gürses (2010). While teaching the course, the researcher frequently used lecture, question and answer, and large group discussion teaching methods, and taught the course process in a teacher-centered manner, focusing on the acquisitions and concepts in the Science Curriculum and adhering to the textbook. At the same

time, the researcher tried to diversify the course process by supporting these topics with visual and auditory tools.

In the experimental group, as in the control group, the researchers taught the science course subjects in line with the subjects and outcomes in the curriculum, diversified the subjects with visual and auditory tools, and tried to get feedback on the subjects with the question-answer method. In addition, the weekly course topics were organized by associating them with concepts based on ecological footprint. This association was based on the 5E Model. They designed different activities for the steps of engagement, exploration, explanation, elaboration and evaluation, which are the main framework of the 5E Model, and transferred them to the course plan. Ecological footprint-based activities associated with the Science Curriculum (Table 1) were supported with visual and auditory tools, and in-class applications were diversified with different techniques. The ecological footprint-based activities prepared on the basis of the curriculum were prepared by the researchers by taking expert opinions in terms of suitability for the purpose, clarity of expressions, and content validity. After these expert opinions, the final shape of the activities was determined. The prepared activities and the related science subjects are presented in Table 1.

Table 1 Prepared ecological footprint-based activities

Week	Subjects and Concepts	Related Science Outcomes (MoNE, 2018)	Activities
1	Resource Utilization and Recycling	F.4.6.1.1. Demonstrates care to be economical in the use of resources. F.4.6.1.2. Recognizes the importance of resources necessary for life and recycling.	Brainstorming Dramatization
2	Electricity Savings	F.4.5.2.2. Discusses the importance of economical use of lighting devices in terms of family and national economy. F.4.6.1.1. Shows care to act economically in the use of resources.	Dramatization Poster Design
3	Food Waste	F.4.2.1.4. Relates human health and balanced nutrition.	BUZZ Groups Demonstration Card Games (BINGO)
4	Water Consumption	F.4.6.1.1.1. Shows care to act economically in the use of resources. F.4.6.1.2. Recognizes the importance of resources necessary for life and recycling.	Experiment-Demonstration Art Activity Water Detective
5	Transportation and Housing	F.4.6.1.1.1. Demonstrates care to act economically in the use of resources. F.4.6.1.2. Recognizes the importance of resources necessary for life and recycling.	Art Activity Design Study
6	Resource Utilization	F.4.5.2.2. Discusses the importance of economical use of lighting devices in terms of family and national economy. F.4.6.1.1. Shows care to act economically in the use of resources.	Video Event Computational Science Practice
7	Resource Utilization and Savings	F.4.6.1.1.1. Demonstrates care to act economically in the use of resources. F.4.5.2.2. Discusses the importance of economical use of lighting devices in terms of family and national economy.	BUZZ Groups Demonstration Group Discussion

| 8 | Ecological Footprint Measurements | F.4.2.1.4. Relates human health and balanced nutrition. F.4.5.2.2. Discusses the importance of economical use of lighting devices in terms of family and national economy. F.4.6.1.1. Shows care to act economically in the use of resources. F.4.6.1.2. Recognizes the importance of resources necessary for life and recycling. | Computational Science Practice Group Discussion |

The duration of the course with the experimental group was tried to be equalized with the duration of the course with the control group by the researcher, taking into account the content of the science course subjects that week. This process continued for eight weeks.

Data collection tools

Ecological Footprint Awareness Scale developed by Coşkun and Sarıkaya (2014) was used as a data collection tool to measure the ecological footprint awareness of primary school students in ecological footprint-based activities. The scale was developed based on ecological footprint calculations. While the scale consists of 46 items in 5 different sub-dimensions, 40 items are used for primary school students (Karakaş et al., 2016). The sub-dimensions of the scale are "Food, Transportation and Housing, Energy, Waste and Water Consumption". Participants respond to the items in these sub-dimensions as "strongly disagree (1), disagree (2), somewhat agree (3), agree (4) and strongly agree (5). The average of the answers given by the participants is used to determine their level of ecological footprint awareness. A high or low average score indicates that the participants' ecological footprint awareness is strong or weak. The Cronbach's Alpha internal consistency coefficient for the entire scale was calculated as 0.93. In this study, the reliability coefficient of the Ecological Footprint Awareness Scale, which was administered to the experimental and control group primary school fourth grade students as pre-test and post-test, was calculated, and 0.90 was calculated in the pre-test and post-test and the scale was considered highly reliable.

Data Analysis

SPSS and Excel package programs were used in the analysis of the Ecological Footprint Awareness Scale applied before and after the ecological footprint-based activities. Data analysis was based on the mean scores of the experimental and control group primary school fourth grade students' ecological footprint awareness pre and post-test mean scores. First of all, Kolmogorov-Smirnov[a] and Shapiro-Wilk tests were performed for the normality of the data. Since the number of data in this study was less than 29, it was analyzed with the results of the Shapiro-Wilk test. The results of the Ecological Footprint Awareness Scale pre-post test Normality Test applied to the student group are presented in Table 2.

Table 2 Pre-post test normality test results

		Kolmogorov-Smirnov			Shapiro-Wilk			Skewness	Kurtosis
		Statistic	df	Sig.	Statistic	df	Sig.		
Exp. Group	Pre Test	0.225	13	0.070	0.926	13	0.304*	-0.410	-0.920
	Post Test	0.132	13	0.200	0.966	13	0.846*	-0.022	0.583
Control Group	Pre Test	0.189	13	0.200	0.888	13	0.092*	-1.289	1.493
	Post Test	0.199	13	0.165	0.927	13	0.308*	0.574	0.660

*p>0.05

In the Shapiro-Wilk normality analysis, it was seen that both the pre-test and post-test data of the Ecological Footprint Awareness Scale showed normal distribution (p>0.05) and the skewness and kurtosis coefficients took a value between -1.5 and +1.5 (Tabachnick et. al., 2013). In this context, it was decided to use parametric measurements in the pre-post test data analysis. The differences between the mean scores of the experimental and control group primary school fourth grade students before and after the process were analyzed using arithmetic mean, analysis of covariance (ANCOVA), and dependent groups t-test, and the effect size (eta square [$\acute{\eta}^2$]) was calculated according to the variances between the scores. ANCOVA is conducted to test the difference between the post-test scores of the groups in order to control the application effect of the pre-test or other variables on the post-test (Büyüköztürk et al., 2016). Before the ANCOVA analysis, the assumptions of whether there is a linear relationship between the within-group dependent variable and the covariate, the equality of the regression slopes, the relationship between the samples whose mean scores will be compared, the height of the relationship between the covariates, and the measurement of the covariate with accurate and reliable measurement tools were checked. It was seen that these assumptions were met for ANCOVA to be used. Effect size is defined as a standardized measure of the difference between means (Çapık, 2014) and was reported as standardized difference in the study. The calculation of effect size is based on the calculation proposed by Cohen (*Cohen's d* formula).

Findings

In this study, it was aimed to improve the ecological footprint awareness of primary school students through ecological footprint-based activities. The findings related to the sub-problems investigated in line with this purpose are given below respectively.

Findings regarding the first sub-problem

Analysis of covariance (ANCOVA) was used to test the post-test mean scores of ecological footprint awareness by controlling the ecological footprint awareness pre-test scores of primary school students in the experimental and control groups. Before the analysis, the assumptions of ANCOVA test were checked. The normality assumption was found to be met for the dependent variable distributions in all subgroups (p>0.05). The relationship between ecological footprint awareness pre-test mean scores, which is the covariate, and ecological footprint awareness post-test mean scores, which is the dependent variable, was examined (r=0.668; p<0.05) and a significant linear relationship was found. At the same time, the independence of the covariate from the practice was checked and the assumption that the covariate is independent of the independent variable was met (r=0.097; p>0.05). It was determined that the joint effect of the covariate and the independent variable was not significant (p>0.05) and it was seen that the assumption of homogeneity of regression trends was realized. After these assumptions were met, the ANCOVA test results were analyzed.

The ANCOVA results of the comparison of the post-test mean scores between the groups by controlling the ecological footprint awareness pre-test scores of primary school students are presented in Table 3.

Table 3. Comparison of mean scores of ecological footprint awareness with ANCOVA

Source	Sum of Square	df	Mean Square	F	p	$\acute{\eta}^2$
Pre-test	2.649	1	2.649	18.326	.000	0.450
Group	0.156	1	0.156	1.078	.010*	

| Error	3.324	23	0.145
Total	6.281	25	

*$F_{(1, 25)}=1.078$; $p=0.010$; $\acute{\eta}^2=0.450$

When Table 3 is examined, F values calculated as a result of ANCOVA were found significant for the pretest (covariate). The fact that the F value for the pretest was significant ($F_{(1, 25)}=18.326$; $p<0.05$) shows that the ecological footprint awareness of primary school students before the process explained a significant variance. Statistically, when ecological footprint awareness pre-test mean scores were taken under control, it was determined that there was a significant difference between the ecological footprint awareness post-test mean scores of primary school students ($F_{(1, 25)}=1.078$; $p=0.010$). The eta squared ($\acute{\eta}^2$) value was calculated as 0.450 and 45% of the variance in the ecological footprint awareness post-test mean scores of primary school students is due to the activity process applied. According to Cohen et al. (2018), this value ($0.14<\acute{\eta}^2$) is a wide effect.

It was determined that the post-test adjusted mean scores of ecological footprint awareness of primary school students in which the ecological footprint-based activity process took place ($\overline{X}$ experiment adjusted=4.04) were higher than the post-test adjusted mean scores of ecological footprint awareness of primary school students in which the courses did not take place ($\overline{X}$ control adjusted =3.88) and there was a significant difference between the mean scores ($p<0.05$). This result can be interpreted as that the ecological footprint-based process significantly increased the ecological footprint awareness of primary school students compared to primary school students where the activities did not take place.

Findings regarding the second sub-problem

The pre-test and post-test ecological footprint awareness mean scores of primary school fourth grade students, in which courses were taught with ecological footprint-based activities, were calculated and compared in Figure 2.
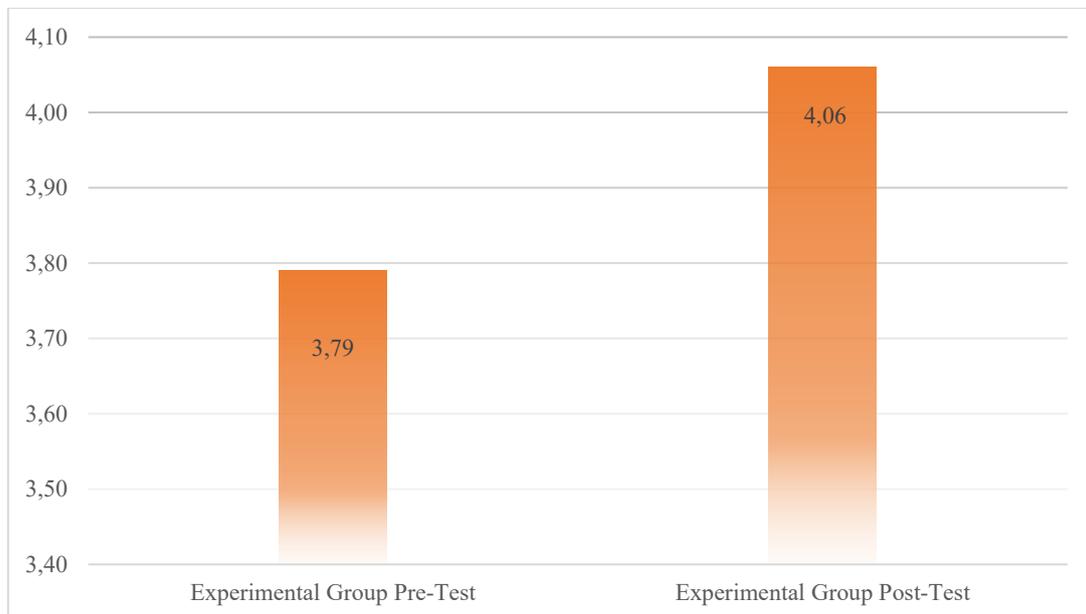
Figure 2 Comparison of ecological footprint awareness pre-post test mean scores of experimental group primary school students

It was calculated that the post-test ecological footprint awareness mean scores of primary school fourth grade students, in which courses were taught with ecological footprint-based activities,

were higher than the pre-test mean scores. The mean scores of the experimental group primary school fourth grade students' ecological footprint awareness before and after the process were compared with the dependent groups t-test and the results are presented in Table 4.

Table 4 Comparison of ecological footprint awareness pre-post test mean scores of experimental group primary school students with dependent groups t-test

Experimental Group	N	Mean	SD	df	t	p	$\acute{\eta}^2$
Pre Test	13	3.79	0.56	12	-2.735	0.018	0.52
Post Test	13	4.06	0.46				

t(12)=-2.735; p<0.05; $\acute{\eta}^2$: 0.52

As seen in Table 4, it was determined that the difference between the ecological footprint awareness pre-post test mean scores of the fourth grade primary school students in the experimental group was statistically significant (p<0.05). The effect size ($\acute{\eta}^2$) of the difference between the pre-post test mean scores was calculated as 0.52 and this value is a medium-sized effect since 0.5>d>0.8. This can be interpreted as teaching courses with ecological footprint-based activities increases primary school students' ecological footprint awareness attitude mean scores with a medium effect.

Findings regarding the third sub-problem

The pre-post test ecological footprint awareness mean scores of fourth grade primary school students who did not participate in ecological footprint-based activities in which curriculum-based courses were taught were calculated and compared in Figure 3.
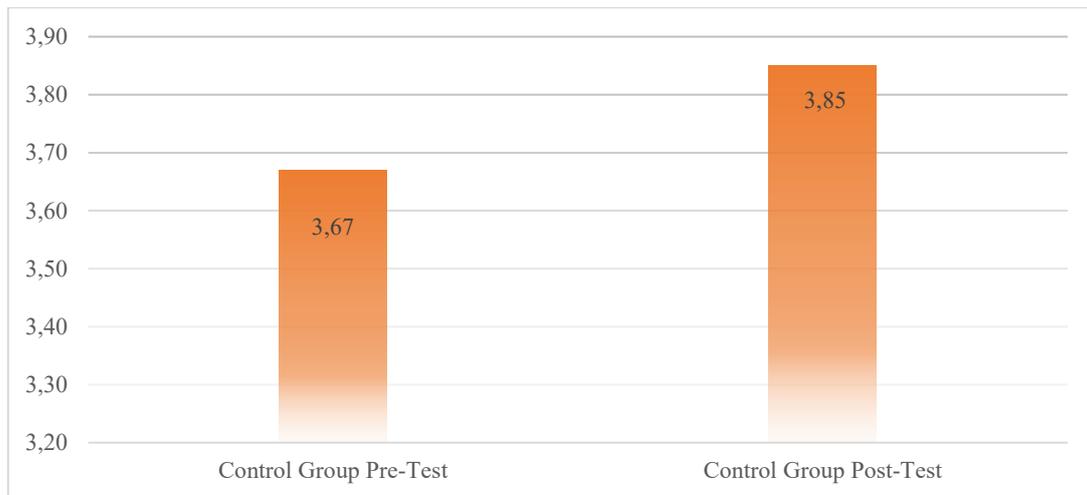
Figure 3 Comparison of ecological footprint awareness pre-post test mean scores of control group primary school students

It was calculated that the post-test ecological footprint awareness mean scores of the fourth grade primary school students, in which the courses were taught on the basis of the curriculum, were higher than the pre-test mean scores. The mean ecological footprint awareness scores of the control group primary school fourth grade students before and after the process were compared with the dependent groups t-test and the results are presented in Table 5.

Table 5 Comparison of ecological footprint awareness pre-post test mean scores of control group primary school students with dependent groups t-test

Control Group	N	Mean	SD	df	t	p	$\acute{\eta}^2$
Pre-Test	13	3.67	0.69	12	-1.132	0.280	-
Post-Test	13	3.85	0.52				

t(12)=-1.132; p>0.05

As seen in Table 5, it was determined that the difference between the pre-post test mean scores of the control group primary school fourth grade students' ecological footprint awareness was not statistically significant (p>0.05). This can be interpreted as curriculum-based courses do not increase the mean scores of primary school students' ecological footprint awareness attitude.

Discussion and conclusion

In this study, it was aimed to improve the ecological footprint awareness of primary school students through ecological footprint-based activities. Within the scope of the study, ecological footprint-based activities were applied to 13 primary school fourth grade students in the experimental group for eight weeks, while 13 primary school fourth grade students in the control group were taught courses based on the curriculum. As a result of the research, when the ecological footprint awareness pre-test mean scores of primary school students were controlled, it was concluded that there was a significant difference between the ecological footprint awareness post-test mean scores of primary school students in which the activity process took place, and the ecological footprint awareness post-test mean scores of primary school students in which the activities did not take place. This result was evaluated as 45% of the variance in the ecological footprint awareness posttest mean scores of primary school students was caused by the activity process applied. Likewise, it was concluded that teaching courses with ecological footprint-based activities applied in the experimental group significantly increased the ecological footprint awareness mean scores of primary school students with a medium effect. On the other hand, curriculum-based courses did not significantly increase the mean scores of primary school students' ecological footprint awareness attitude. In this context, it was concluded that teaching courses with ecological footprint-based activities increases primary school students' ecological footprint awareness. Brooks et al. (2018) stated that with ecological footprint calculation activities, it becomes possible to determine the amount of land and water area needed to support human activities and meet their needs, thus helping to evaluate sustainability and environmental impacts. Cordero et al. (2008) found that students' participation in action learning activities centered on ecological footprints helped them understand the link between sustainability and environmental concepts (personal energy consumption-global warming). In their research, Şahin and Karayılan (2019) concluded that ecological footprint-based games positively affected students' environmental literacy. Karakaş et al. (2016) measured students' ecological footprint awareness before and after activity-based applications and found a statistical difference between the pre- and post-test averages of awareness. Pullu (2023) argues that involving students in activities related to ecological footprint instills a sense of responsibility towards the environment and empowers them to make conscious decisions to reduce their ecological impact. Because activities aimed at understanding the concept of ecological footprint motivate students to increase their awareness of climate change, including its causes and consequences, and to contribute to reducing environmental challenges (Ramos, 2024). Therefore, it is thought that the ecological footprint-based activities carried out with primary school students in this research will make positive contributions to improving students' understanding of environmental issues and encouraging pro-environmental behaviors.

In order to ensure continuity of life, it should be organized by taking into account the resource capacity to meet people's needs. However, it is not realized that the needs in the life cycle are exceeded on the basis of natural resources. Therefore, it is necessary for all individuals to gain awareness of using their resources efficiently and balanced by going through various trainings. Different activities need to be implemented, especially in creating ecological risk profiles and

promoting sustainable living practices (Akten & Akyol, 2018). Educational processes given in early childhood are important in gaining environmental awareness in connection with a sustainable life (Güngör & Cevher-Kalburan, 2022). Uğraş and Zengin (2019) emphasized that it would be more beneficial for the education required for a sustainable environment to start from the pre-school period. Munkebye et al., (2020) argue that when primary school students are included in sustainability activities, it not only increases their awareness of environmental issues, but also equips them with the necessary competencies to address complex sustainability issues. Exposure to these practices at an early age can lead to the development of students' critical thinking skills, provide them with a sense of responsibility, and contribute to their ability to demonstrate sustainable behaviors necessary to address future environmental challenges (Hirsh, 2016).

Recommendations

In today's world, where increasing environmental pollution and global warming are increasingly on the agenda, dissemination of applied activities will be effective in creating environmental awareness and transforming this into attitude and behavior. Based on these research findings, it is recommended that students at all levels be given practical activities on environmental education based on the concept of sustainability in raising future generations. Depending on the concept of sustainability, which will be integrated into primary school curricula, it should be considered important to present topics such as ecological footprint, carbon footprint or water footprint calculations to students and to focus on in-class and out-of-class activities. Students' environmental awareness, knowledge and commitment to sustainable practices can be increased through activities based on ecological footprint. It is recommended that these activities be carried out in parallel with the curriculum of life sciences, social studies and science, and that similar studies be prepared at all educational levels, as it is thought that they will affect the production and consumption habits of future generations. Educational drama, ecological footprint calculation and comparison, case studies, outdoor activities and field trips, and different methods and techniques that encourage critical thinking can be used, taking into account the student level.

Acknowledgements

Ethical statement

Primary school students stated that they did not suffer any academic or psychological harm at the end of the study. The authors declare that no unethical action was taken in this study, that the responsibility in all cases that may arise from ethical violations belongs to the author(s), and that the informed consent/consent form was signed by the participants.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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