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| Research Article / Araştırma Makalesi |

Examining the Impact of Interdisciplinary Practices on Secondary School Students' Awareness of Sustainable Living

Disiplinler Arası Uygulamaların Ortaokul Öğrencilerinin Sürdürülebilir Yaşama Yönelik Farkındalıkları Üzerindeki Etkisinin İncelenmesi

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Keywords

1. Education for sustainable development
2. Sustainable living
3. Interdisciplinary approach

Anahtar Kelimeler

1. Sürdürülebilir kalkınma eğitimi
2. Sürdürülebilir yaşam
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Abstract

Purpose: This study aimed to determine the effect of the practices carried out according to an interdisciplinary approach on students' awareness of sustainable living.

Methodology: In the present study, one group pre-test post-test experimental design, one of the quasi-experimental methods, was used. A total of 46 activities were carried out in 33 weeks of the academic year within the scope of 11 different courses and social club practices with 37 secondary school students who participated in the study. The study data were collected using the Sustainable Living Awareness Scale.

Findings: As a result of the activities carried out, students' awareness of sustainable living increased significantly on an overall scale and in the social, economic, and environmental sub-dimensions of the scale.

Highlights: The present study concluded that the activities carried out over a long period with an interdisciplinary approach reflected positively on the awareness of the students. It is recommended to take steps to make teacher candidates and teachers aware of the concept of sustainable development and for the development of teacher candidates and teachers on sustainable development.

Öz

Çalışmanın amacı: Araştırmada disiplinler arası bir yaklaşıma göre yürütülen uygulamaların öğrencilerin sürdürülebilir yaşama yönelik farkındalıklarına olan etkisinin belirlenmesi amaçlanmıştır.

Yöntem: Mevcut araştırmada yarı deneysel yöntemlerden biri olan tek grup ön test son test deneysel desen kullanılmıştır. Çalışmaya katılan 37 ortaokul öğrencisi ile 11 farklı ders ve sosyal kulüp uygulamaları kapsamında eğitim öğretim yılının 33 haftasında toplamda 46 etkinlik yürütülmüştür. Araştırmada veriler Sürdürülebilir Yaşama Yönelik Farkındalık Ölçeği ile toplanmıştır.

Bulgular: Yürütülen faaliyetler sonucunda öğrencilerin sürdürülebilir yaşama yönelik farkındalıkları ölçeğin hem toplum, ekonomi ve çevre boyutlarında hem de tamamında anlamlı olarak artış göstermiştir.

Önemli Vurgular: Araştırma sonucunda disiplinler arası bir yaklaşım ile uzun zaman diliminde yürütülen faaliyetlerin öğrencilerin farkındalıklarına olumlu yansıdığı sonucuna ulaşılmıştır. Aynı zamanda öğretmen adayları ve öğretmenlerin sürdürülebilir kalkınma kavramından haberdar olmaları ve bu konudaki gelişimlerine yönelik adımlar atılması önerilmiştir.

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INTRODUCTION

In the song titled "Who's Gonna End?" launched by the United Nations Development Programme (UNDP) Turkey Office, some important questions were being addressed about our world and humanity at its core. These questions included who would end poverty, who would end gender discrimination, who would fight climate change, and who would keep water clean. Although the questions were listed in this way, there was only one answer, and that was as Sertab Erener expressed in the song: "*Why can't we see. It's not just you, it's not just me, it's all of us.*" (UNDP, 2023).

As expressed in the World Wide Fund for Nature's (WWF) 2022 Living Planet Report, we will face serious problems due to humanity's unconscious use of the Earth. To save our planet from its current state, we all have responsibilities, and the necessary steps must be taken together as soon as possible. The necessary steps to be taken for the present and future of the planet have paved the way for the concept of sustainable development. The concept of sustainable development is defined in its simplest form as meeting the needs of humanity today while maintaining the ability of future generations to meet their needs (WCED, 1987). Therefore, all individuals should act with the awareness that others will use the world after them (Tietenberg, 2006). The natural resources used by humanity today are legacies that have been passed down from the past to the present, and they need to be transferred to the future as well. Therefore, individuals should fulfill their responsibilities and use natural resources sustainably for the preservation of both the present and the future of the Earth. The concept of sustainable development has three dimensions: environmental, social, and economic, which are directly interacting with each other (Harris, 2000; Soubbotina, 2004). People need to consider these three dimensions of sustainable development as a whole, regardless of the circumstances. A disruption in one of these three dimensions affects the overlooked dimensions over time (Strange & Bayley, 2008).

Although different perspectives have been put forward in every period on issues such as the definition, objectives, and indicators of sustainable development, the idea that Education for Sustainable Development (ESD) plays a significant role in achieving sustainable development is widely accepted by societies (Bonnett, 1999; Foster, 2001). The Earth's natural resources might seem limitless, but at a certain point, they will be insufficient to meet people's needs (Raven & Berg, 2006). To prevent such a scenario and avoid potential catastrophes, individuals should be educated from a young age about the sustainable use of resources (Hofman-Bergholm, 2018; Yüzbaşıoğlu & Kurnaz, 2022). ESD encourages individuals to have competencies such as thinking critically, imagining possible scenarios that may be encountered in the future, and collaboratively taking steps (UNESCO, 2014). Through teaching practices, individuals can be provided with the necessary knowledge for a sustainable world (Stratton et al., 2015). In this way, responsible individuals who are concerned about the planet's future can be raised, and sustainable development can be promoted (Eilks et al., 2014).

ESD aims to educate individuals so that they can make sustainable decisions in the future (Walls, 2011). Educators have important responsibilities in terms of raising individuals who are aware of the concept of sustainable development and take steps towards the realization of sustainable development goals in their daily lives (Anyolo et al., 2018; Hungerford, 2010; Wals, 2011; Yüzbaşıoğlu & Kurnaz, 2021). In teaching environments, educators may experience difficulties or disruptions related to ESD. One of the main points where educators have difficulty is the lack of educational materials (Kahriman, 2016). To prevent these deficiencies from reflecting on students and to eliminate them, educators and policymakers have important duties. Teachers need to start their profession well-trained in sustainable development (Hofman-Bergholm, 2018) and to keep their knowledge up-to-date (Salite, 2015). Thus, they can allocate more space in their lessons for instructional activities that can prepare students for possible situations they may encounter in their daily lives.

Although the concept of sustainable development is discussed at certain rates in different courses, students think that the concept of sustainable development is a subject that should be learned within the scope of science courses because it is mostly included in science lessons. Research emphasizes that the concept of sustainable development should be addressed in all courses with an interdisciplinary understanding rather than a specific course (Colucci-Gray et al., 2013; Jabareen, 2011). The presence of different dimensions of sustainable development such as environmental, social, and economic aspects necessitates the use of an interdisciplinary approach in ESD (Jabareen, 2011; Parker, 2010). With the activities carried out based on an interdisciplinary approach, it will be possible to address ESD more comprehensively (Yüzbaşıoğlu & Kurnaz, 2022). Current curricula have shortcomings in ensuring the active participation of students in the context of sustainable development (Holbrook, 2009; Tanrıverdi, 2009). It is stated that nature trips, drama, observation, and reading books are mainly included as teaching practices in ESD (Kahriman, 2016). Including such activities on ESD causes students to stay in more observer positions. When the literature is examined, it is determined that studies related to sustainable development are generally conducted with teachers/teacher candidates, and the analysis of the curriculum is often the focus. In these studies, the subject area and pedagogical knowledge of teachers and teacher candidates regarding sustainable development concept are identified (Corney & Reid, 2007), their conceptual understanding of sustainable development is examined (Borg et al., 2014), their views on ESD topics are determined (Nas & Çoruhlu, 2017; Spiropoulou et al., 2007), and their attitudes and awareness about ESD are revealed (Faiz & Bozdemir Yüzbaşıoğlu, 2019; Keleş, 2017; Mogren et al., 2019). In studies related to curriculum, curriculum documents have been examined in terms of ESD (Kaya & Tomal, 2011; Yüzbaşıoğlu & Kurnaz, 2022), and issues such as the lack of sufficient content and learning outcomes related to sustainable development in the curriculum (Tanrıverdi, 2009; Yüzbaşıoğlu & Kurnaz, 2022) have been criticized. It is noticeable that direct practical studies with students are limited and there are deficiencies in this area. However, environmentally-oriented practices carried out in schools allow students to use their knowledge of the environment in subjects

directly related to their daily lives and offer the opportunity for sustainable development (Bajd & Lescanec, 2011). Based on these issues, in this study, it is considered that the activities carried out by secondary school students within the scope of different courses will contribute to their awareness of sustainable development. In this regard, the present study aimed to determine the impact of interdisciplinary practices conducted on students' awareness of sustainable living.

METHOD

Research Design

In the present study, one group pre-test post-test experimental design, one of the quasi-experimental methods, was used. In single-group pre-test post-test experimental designs, the independent variable is applied to a group, and measured before and after the experiment (Cohen & Manion, 1997; Fraenkel & Wallen, 1996). In this study, the effect of interdisciplinary practices on awareness of sustainable living is examined.

Study Group

The study group consists of a total of 37 middle school students, including nine 5th graders, five 6th graders, ten 7th graders, and thirteen 8th graders, studying at a middle school in the northern region of Turkey. Convenience sampling is a non-random sampling method used in this study. The participants in the study group are selected according to certain criteria such as geographical proximity, availability at a certain time, easy accessibility, and willingness to volunteer (Dörnyei, 2007).

Teaching Practices

The students who participated in the study participated in a total of 46 activities in 33 weeks of the academic year within the scope of 11 different courses and social club activities. The courses in which the activities took place are shared in Figure 1.

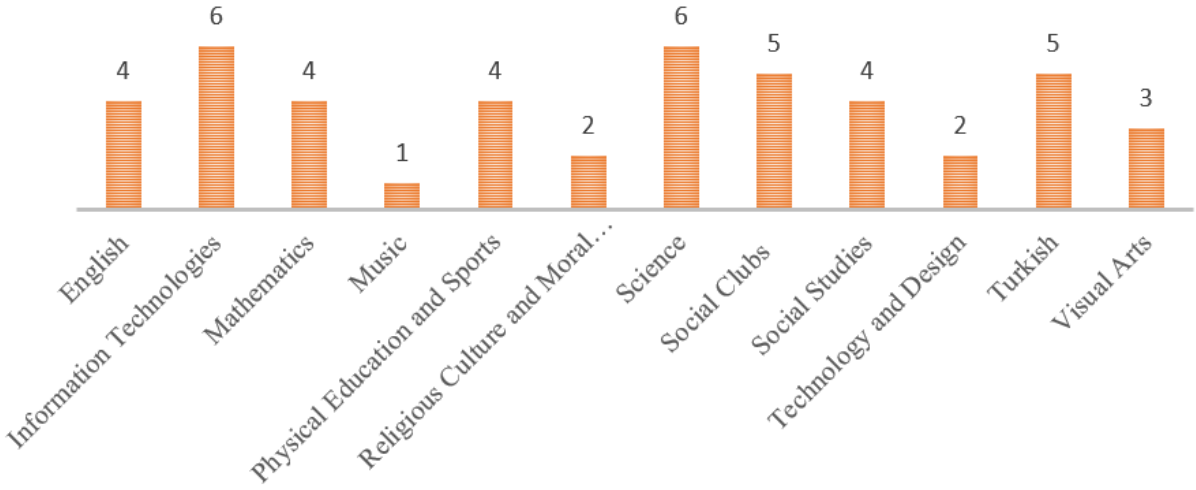


Figure 1. Courses and Number of Activities

Within the scope of the English lesson, brochures and banners on the subject of environmental awareness were prepared. A board was prepared based on the activities students conducted at school and home with the hashtag #gogreen. A word tree was designed, made from recycled materials, and placed in a suitable area in the classroom. A game was designed to find the English meanings of recycling and environmental symbols and played with students.

In the information technology course, students were given training within the scope of "Energy Saving Week". Students designed recycling buckets with Arduino. Students prepared short videos with the theme "Don't throw me away, because..." A virtual tour of compost and recycling facility was organized with the students. Using computer programs they were familiar with, students designed recycling logos and played computer games related to the environment.

In the mathematics class, sample questions were solved that were aligned with the structure of the topic and focused on the concept of waste. Bookmarks with a theme related to World Pi Day were prepared, teaching materials were designed using waste materials, and various geometric shapes were created from waste materials.

In music class, students sang by making musical instruments from waste materials.

In Physical Education class, students planted saplings as part of the National Reforestation Day, designed and played children's games using waste materials, created kites using packaging waste and plastic bags and flew them, made flowerpot designs from unused burst balls, and planted flowers in them.

In the Religious Culture and Moral Knowledge class, topics related to the importance Prophet Muhammad placed on the environment and the significance of the environment in Islam was discussed. The subjects of preventing waste and promoting saving were also addressed.

As part of the science course, students were informed about the zero-waste concept. A display board was prepared, a rainwater collection activity was conducted, and the collected rainwater was used to water class flowerpots. Seed balls were prepared from waste paper and left in nature. A dynamometer was designed using waste materials, an insect hotel was created, and eco-printing applications were carried out.

Within the scope of social clubs, students prepared a Teachers' Day bulletin board from waste paper. They organized recycling activities during World Recycle Week. They created a bulletin board for Forest Week. As part of the celebrations for April 23rd National Sovereignty and Children's Day, they made models of children from around the world using waste materials. Additionally, they prepared a bulletin board for Environmental Protection Week.

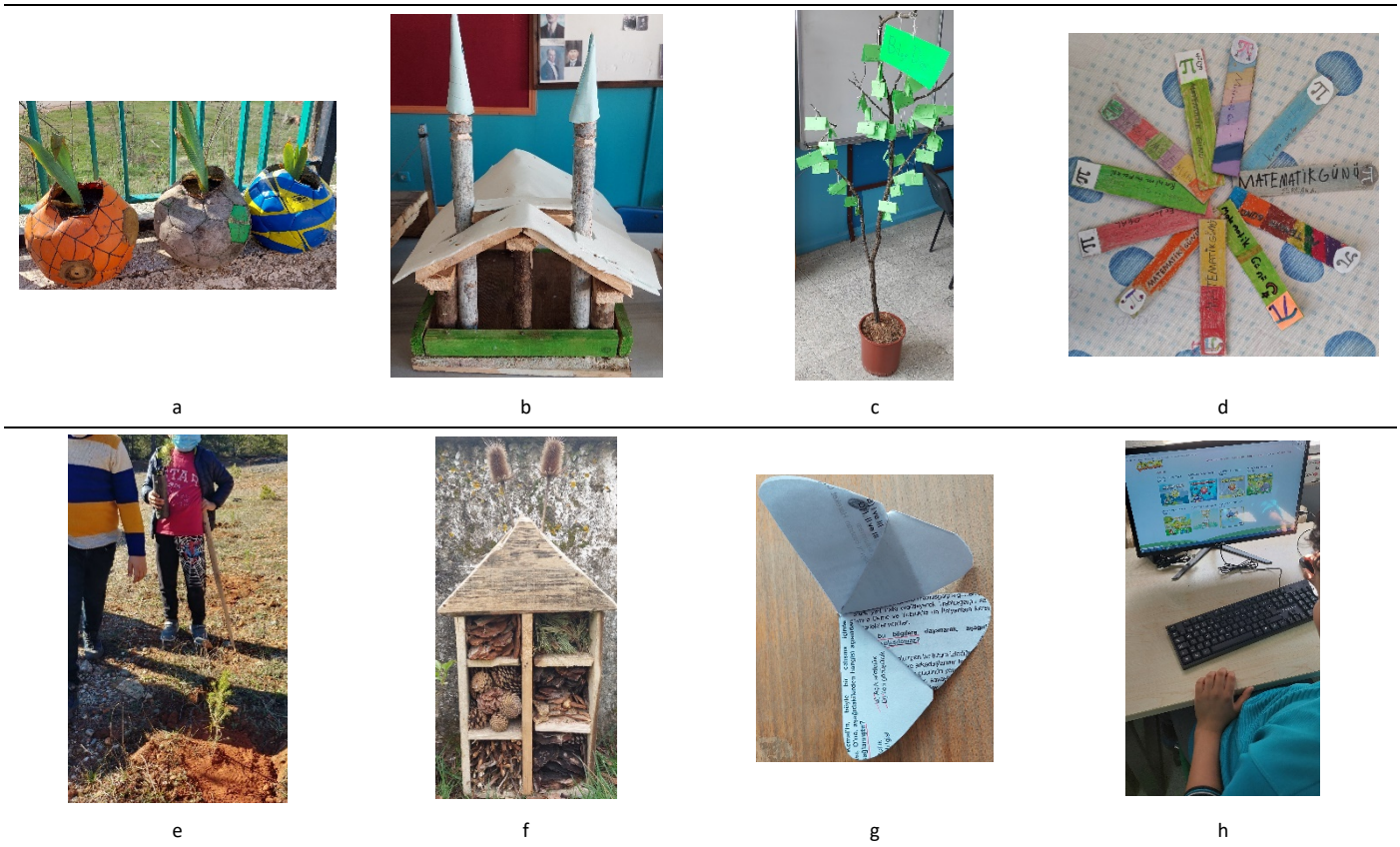
In the social studies course, the subject of Atatürk's love of trees was discussed. Students were enabled to model the historical places and artifacts around them using waste materials. Organizations operating to protect the environment in Turkey were introduced, and international environmental agreements to which Turkey is a party were introduced to the students.

Within the scope of the technology and design course, students made school logo designs from waste materials and prepared an environmentally friendly village model.

Within the scope of the Turkish language class, students were shown logos of environmental organizations and encouraged to brainstorm about their meanings. Environmental-themed haikus were prepared. Acrostic poems related to the environment were written. A creative writing activity involving environmental topics was conducted, and exercises on writing petitions were carried out to establish communication with local organizations.

In the visual arts class, origami activities were held using waste paper. A painting contest was organized for March 22, World Water Day. Waste paper was recycled and different designs were made from paper pulp.

Figure 2 shows the visuals of the activities carried out by the students.



a: Flower pot design from old balls, b: Model of local historic sites, c: Word tree, d: World pi day themed bookmark, e: National Reforestation Day sapling planting, f: Bug hotel, g: Origami, h: Eco-oriented computer game

Figure 2. Sample student activities

Data Collection and Analysis

The study data was collected using the Sustainable Living Awareness Scale (SLAS), a 3-point Likert-type scale with twenty items, developed by Akgül and Aydoğdu (2020). The SLAS consists of three dimensions "Society (8 items)", "Environment (7 items)" and "Economy (5 items)" and the internal consistency reliability coefficient is calculated as .77. For the present study, the reliability coefficient was found to be .771.

At the beginning of the academic year, the SLAS was administered to the students as a pre-test and then re-administered as a post-test after 33 weeks of activities. The study data was analyzed using SPSS software. In addition to descriptive statistics, the dependent groups' t-test was used to determine the effect of interdisciplinary activities on students' awareness of sustainable living.

FINDINGS

Within the scope of the study, the effect of interdisciplinary activities carried out by secondary school students on their awareness levels for sustainable living was examined. In this regard, SLAS was administered before and after the activities, and descriptive statistics and dependent group t-test findings related to the obtained data are presented below. Descriptive statistics for the pre-test and post-test scores of students' sustainable living awareness are presented in Figure 3.

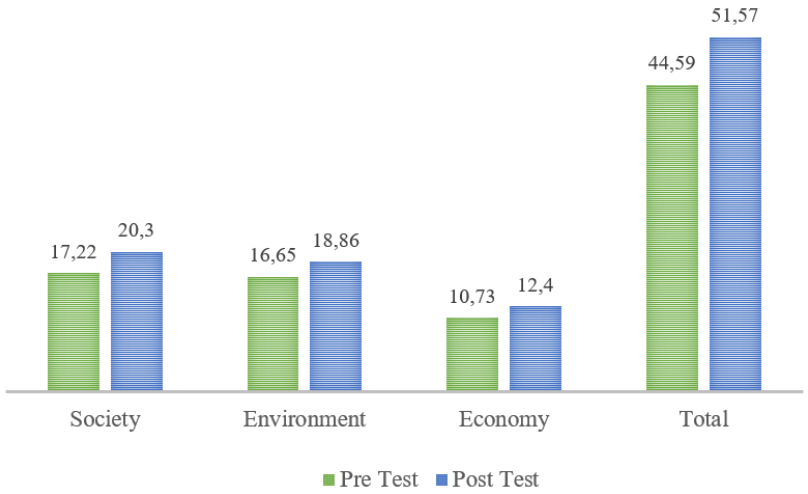


Figure 3. Descriptive statistics on students' awareness of sustainable living pre-test and post-test scores.

As can be seen in Figure 3, the mean pre-test scores for students' sustainable living awareness before the activities are as follows: social dimension $\overline{X}$=17.22, environmental dimension $\overline{X}$=16.65, economic dimension $\overline{X}$=10.73, and the total score $\overline{X}$=44.59. After a total of 46 activities carried out by the students for 33 weeks, the mean post-test scores are as follows: social dimension $\overline{X}$=20.30, environmental dimension $\overline{X}$=18.86, economy dimension $\overline{X}$=12.40, and the total $\overline{X}$=51.57. As can be seen in Figure 3, the students' awareness of sustainable living scores increased in favor of the post-test in overall scale and in all dimensions of the scale. In terms of the social dimension, the dependent group t-test results regarding the pre-test and post-test scores are presented in Table 1.

Table 1. Dependent group t-test results regarding social dimension

Measurements	N	$\overline{X}$	Sd	sd	t	p
Pre-test	37	17.22	3.19	36	6.859	.000
Post-test	37	20.30	2.12			

As can be seen in Table 1, students' awareness of sustainable living pre-test and post-test scores shows a significant difference in favor of the post-test in the social dimension. Based on this situation, it can be stated that students' awareness has increased after the activities about not making changes to the environment for their own needs, recognizing that humanity's purpose of existence is not to dominate nature, understanding that poverty and hunger are not at the same level in all countries, acknowledging the significant population growth rate on Earth, understanding that population growth affects the consumption of natural resources, and realizing that there are not enough natural resources on Earth to meet the needs of all humanity.

The dependent group t-test results for the pre-test and post-test scores of the students in terms of the environment dimension are presented in Table 2.

Table 2. Dependent group t-test results for the environment dimension

Measurements	N	$\overline{X}$	Sd	sd	t	p
Pre-test	37	16.65	3.05	36	4.170	.000
Post-test	37	18.86	1.93			

As can be seen in Table 2, the pre-test and post-test scores of the students show a significant difference in favor of the post-test in the environment dimension. After the activities carried out by the students, it can be stated that their awareness of the

decrease in forest areas due to urbanization, the rights to life of plants and animals, human-induced desertification, the decrease in biodiversity, the extinction of plant and animal species and the impact of humans on this situation, and the global effects of environmental problems have increased positively.

The dependent group t-test results for the pre-test and post-test scores in the economy dimension are presented in Table 3.

Table 3. Dependent group t-test results for the economy dimension

Measurements	N	$\overline{X}$	Sd	sd	t	p
Pre-test	37	10.73	1.68	36	4.926	.000
Post-test	37	12.40	1.75			

As can be seen in Table 3, students' pre-test and post-test scores show a significant difference in favor of the post-test in the economy dimension. The activities carried out by the students have contributed positively to their awareness of issues such as effects on world income distribution, the relationship between the country's economy and raw materials, green building applications, renewable resources, and the use of waste materials.

The dependent group t-test results for the pre-test and post-test scores of the overall scale are presented in Table 4.

Table 4. Sustainable living awareness t-test results

Measurements	N	$\overline{X}$	Sd	sd	t	p
Pre-test	37	44.59	6.14	36	7.350	.000
Post-test	37	51.57	4.35			

As can be seen in Table 4, students' overall scale pre-test and post-test scores differ significantly in favor of the post-test. In other words, it was determined that the practices carried out by the students caused a significant increase in their awareness of sustainable living.

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

Despite numerous research efforts over the years to achieve sustainable development goals, the fact that relevant issues continue to persist in the present day is a significant indicator that solutions have not been permanently effective (Yüzbaşıoğlu & Kurnaz, 2022). Therefore, conducting studies related to the concept of sustainable development with a focus on humanity would be much more beneficial (Blair, 2008). Although there are many objectives for ESD, there can be shortcomings in achieving these objectives (Yüzbaşıoğlu & Kurnaz, 2021). Many reasons such as insufficient inclusion of sustainable development in curricula, the complexity of sustainable development goals, lack of or inadequate educational tools and inadequate social participation lead to failure to reach the desired levels in ESD (McKeown et al., 2002). Although the subjects and achievements related to sustainable development are included in the secondary school level curriculum in Turkey, studies determined that the students have not heard of this concept at a sufficient level before (Demir & Atasoy, 2021). This is an indication that the concept of sustainable development is not given enough space in the courses or that the activities carried out are insufficient. To achieve sustainable development, it is essential to ensure sustainability in all three dimensions, environmental, economic, and social, by all individuals who make up the society. Theoretical knowledge alone is not enough for this to happen. In addition to theoretical knowledge, individuals should also take practical steps. In the present study, various practices were carried out focusing on students within the scope of different courses aimed at improving the awareness of secondary school students about sustainable living. At the end of these activities, it was determined that the awareness of the students toward sustainable living developed positively.

The information contained in ESD is fed by more than one discipline including science, social sciences, and humanities. Demir & Atasoy (2021) stated that students mostly learn about sustainable development concepts in science and social studies classes, while they learn much less about them in Turkish, technology design, music, visual arts, information technologies, physical education, mathematics, English, and religious culture classes. In the present study, activities were carried out taking into account the weekly class durations of the courses, ensuring that there is no significant disparity in proportions between the classes (see Figure 1). The fact that activities carried out in different courses contribute to increasing students' awareness of sustainable living can be considered as an indication that their tendency to associate the concept of sustainability primarily with science subjects could be addressed. Addressing the issue of sustainable development mainly as a single course in science may limit the adequate understanding of the comprehensive structure of the subject by students. The intensive curriculum of science courses is insufficient to address the teaching of issues related to sustainable development in detail (Gayford, 2002). In previous studies, supporting this situation, it was stated that the concept of sustainable development should be considered an interdisciplinary subject rather than teaching it with a single course (Anyolo et al., 2018; Gayford, 2002; Gustaffsson et al., 2015; Yüzbaşıoğlu & Kurnaz, 2021). For this reason, ESD should be considered interdisciplinary, not with a single course, but with more than one course. Thus, students will be able to make the necessary associations by making connections between environmental, social, and economic dimensions. In the present study, supporting this situation, the activities carried out within the scope of 11 different courses related to the environmental, social, and economic dimensions of sustainability contributed to the development of students' awareness of sustainable life.

Theoretical studies on ESD are mainly carried out on curricula, teacher candidates, and teachers. Studies on ESD for the younger age group at both international and national levels are rare. In the conducted studies, it has been stated that only a small portion of secondary school students had heard of the concept of sustainable development before (Demir & Atasoy, 2021). It was determined that the students who knew the concept of sustainable development were more interested in the environmental dimension of sustainable development and their knowledge of the economic and social dimensions was weak (Borg et al., 2014; Demir & Atasoy, 2021). When the relationship balance between the sustainable development dimensions established by Munasinghe (1993) is examined, it is revealed that each dimension has equivalent value and there is no order of significance between each other. Secondary school students stated that while they frequently encountered concepts related to the environmental dimension of sustainability in the lessons, they encountered concepts related to social and economic dimensions much less (Demir & Atasoy, 2021). When the globally determined sustainable development goals and sub-goals are examined to protect the future of the planet, it is seen that sustainability is not only about the environmental dimension. Therefore, in the activities carried out in teaching environments, the social and economic dimensions of sustainable development should be included as well as the environmental dimension (Burkaz-Ekinci, 2021). Ignoring one of the dimensions of sustainable development will undoubtedly cause problems in other dimensions in the future. In the present study, activities were carried out not only for the environmental dimension of sustainable development but also for the social and economic dimensions. In this regard, activities such as rainwater collection, communicating with local organizations, taking steps to prevent waste, taking part in social responsibility projects, and upcycling practices were carried out in different courses. After these activities, students' awareness of sustainable living has developed positively both in social and economic dimensions, as well as the overall scale.

Individuals may experience deficiencies in addressing environmental problems that they cannot directly observe in their immediate environment (Bozdemir Yüzbaşıoğlu, 2020). Within the scope of the study, all of the activities carried out by the students were selected from the subjects they had the opportunity to observe directly in their daily lives and the school environment. Within the scope of environmental education, activities carried out outside the traditionally accepted teaching environments reflect positively on students' knowledge of the environment (Carrier, 2009). In addition to directly imparting knowledge to individuals, ESD aims to provide them with the necessary skills, values, and perspectives related to sustainability (Hopkins & Mckeown, 2002). For this to be achieved, different teaching methods and techniques that prioritize student-centered approaches and interaction should be employed (Corney & Reid, 2007). It is stated that it is more appropriate to include inquiry-based teaching, discussion, field studies, case studies, and experimental activities in teaching environments during ESD compared to traditional teaching methods (Corney & Reid, 2007). Thus, the environment is prepared for students to explain and evaluate their thoughts (Hicks, 2002). The results of the present study also support this situation. A total of 46 activities carried out by the students during the 33 weeks in which they were directly involved were found to reflect positively on students' awareness of sustainable living.

When the literature is reviewed, it can be seen that in many conducted studies, the issues of not polluting and preserving the environment (Bozdemir Yüzbaşıoğlu, 2020; Uyanık, 2017; Yaşaroğlu & Akdağ, 2013) are addressed, but the social and economic dimensions of environmental protection remain superficial. The steps taken for the future of the world should encompass not only the preservation of the environment but also its economic and social dimensions, which is of utmost importance. Thus, it will be possible to build a sustainable future. In their study conducted with 646 secondary school students, Demir & Atasoy (2021) found that students encounter the environmental, social, and economic dimensions of sustainable development more frequently in extracurricular activities compared to in-school activities. Students expressed that they frequently encounter concepts related to sustainable development through extracurricular activities, social clubs, communication channels such as TV, and the Internet, and projects. Considering the importance of schools in providing students with planned behaviors and the goals of the curriculum on sustainable development (Yüzbaşıoğlu & Kurnaz, 2022), it can be stated that this situation is a significant problem in raising individuals who will build the future of our world. The present study determined that the activities carried out with an interdisciplinary approach have positive effects on the sustainable development awareness of the students. In their study, Demir and Atasoy (2021) found that students approached environmental issues globally and expressed that what other countries do to improve or harm the environment also concerns them. In the present study, it can be stated that sustainable development is perceived as a global situation based on the responses of the students to the scale. Students in similar age groups stated that people should be ready to make sacrifices if necessary to raise the living standards of people other than themselves (Demir & Atasoy, 2021). The present study determined that students at the secondary school level have an awareness of economic growth and income justice as well as protecting the environment and that this awareness can be increased even more with activities in which students can participate actively.

The awareness of the individuals who make up society directly affects their attitudes and behaviors (Vrasidas et al., 2007). For sustainable development to take place on a global scale, all individuals who make up societies should have positive attitudes toward achieving sustainable development goals and objectives. ESD aims to raise individuals with awareness of sustainable development, thereby providing societies with the opportunity to live in a healthier, more reliable, and fairer world across generations (Öztürk Demirbaş, 2015). Individuals who are highly aware of sustainable development are more aware of environmental problems and more sensitive to environmental protection (Fien, 2006). Therefore, it is stated that activities to raise students' awareness of sustainable living should be utilized in teaching environments (Azrak, 2023). As a result of the present study, it was found that the awareness of the students towards sustainable living was at a moderate level in the pre-test, and after the activities were carried out it was at a high level in the post-test. The fact that the awareness of the students has increased at

the end of the activities in which they can directly participate for about an academic year can be accepted as an indication that they can transfer the concept of sustainability to their lives.

The results of this study revealed that interdisciplinary activities within the scope of different courses had positive effects on students' awareness of sustainable living. The fact that the rate of increase in the post-test scores of the scale is close to each other in the dimensions of environment, society, and economy shows that the interdisciplinary activities carried out ensure an equal rate of improvement in all dimensions of sustainable development. To achieve sustainable development, all individuals that makeup societies need to take steps towards all dimensions of sustainable development. The fact that this has happened in the present study can be considered one of the significant results of the study. To spread this result of the study to the general, it will be useful for all branch teachers to include more activities related to sustainable development in their lessons. For this to be achieved and for the ESD to achieve its objective, all teachers must have sufficient knowledge and awareness of sustainable development. In this way, they will be able to transfer and share these awarenesses with their students in educational environments. In previous studies, it is stated that the university education of teachers who are actively involved in ESD should be reorganized by considering the needs of students and teachers (Spiropoulou et al., 2007), and in-service training should be provided to provide an opportunity for current teachers to make ESD more effective (Tilbury, 2011). Therefore, based on the field literature and the results of the present study, it will be a significant step to provide training to increase the competencies of teachers for ESD during their undergraduate education. Teachers who are on duty should be given the necessary information through in-service training. Additionally, curriculum developers need to create and share more examples of activities and teaching materials related to sustainable development.

Declaration of Conflicting Interests

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Statements of publication ethics

I hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Researchers' contribution rate

The study was conducted and reported by the researcher.

Ethics Committee Approval Information

This study received ethics approval from the Kastamonu University Social and Human Sciences Research and Publication Ethics Board (Dated 09.06.2022 and numbered 2022/6/18).

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