Political Economy and Management of Education

ISSN: 2717 - 9613 dergipark.org.tr/peme

RESEARCH ARTICLE

Teachers' Perspectives on Environmental Education Practices in Schools from the Perspective of Sustainable Schools

Ata Gündüz Uygun*[1] | Mustafa Bayrakcı[2] |

[1]Ministry of National Education, Sakarya, Türkiye

[2]Prof. Dr, Faculty of Education, Sakarya University, Sakarya, Türkiye

Correspondence:

*Ata Gündüz Uygun

Email: ata.uygun@gmail.com

Submitted: 18.04.2025
Revision Requested: 05.05.2025
Revision Received: 10.05.2025
Published Online: 10.05.2025

Citation: Uygun, A.G. & Bayrakcı, M. (2025). Teachers' Perspectives on Environmental Education Practices in Schools from the Perspective of Sustainable Schools. *Political Economy and Management of Education* (6)1, 18-44.

Abstract

This study aims to determine the perspectives of teachers working in Sakarya province regarding environmental education practices in schools from the perspective of sustainable schools. The research employs the phenomenological design, a qualitative research method, focusing on participant perspectives. While the study population consists of teachers working in Sakarya province, a sample of 20 participants from various school types and levels was selected. Data were collected through a semi-structured interview form and analysed using the content analysis method. The findings indicate that teachers do not fully comprehend the concept of sustainability in all its dimensions and that sustainable schools are insufficient in both quantity and quality. Although education is considered a prerequisite for ensuring a sustainable environment, students have not yet reached the desired level of environmental awareness. It was determined that the competencies of teachers should be increased in order for environmental education to be at the desired quality. Based on the research results, since education—and thus teachers—plays a crucial role in ensuring a sustainable future, it is recommended that teacher competencies should be strengthened. Additionally, it is stated that the number and quality of sustainable schools should be increased, environmental education should be student- centred and practice-based, and environmental awareness should be disseminated across all segments of society.

Keywords: *Sustainability, environmental education in sustainable schools, environmental awareness, teacher perspectives, phenomenological research.*

Introduction

All living beings depend on natural resources for survival. Humans have utilized underground and surface resources, similar to other living creatures, since the beginning of their existence. However, the excessive and unconscious use of these resources beyond survival needs is unique to humans. Following the Agricultural Revolution, humanity transitioned to a settled lifestyle, and with the Industrial Revolution, the global population increased exponentially. The increasing demand for food, raw materials, and energy, which is driven by rapid population growth and expanding economic sectors, has led to excessive consumption of already limited natural resources (Goodland, 1995). The use of fossil fuels in energy production has triggered the release of greenhouse gases into the atmosphere, causing global temperature increases and related disasters. These challenges have resulted in irreparable environmental crises, collectively termed environmental problems (Alpaslan et al., 2018).

Major environmental problems include global warming, climate change, rising sea levels due to glacial melting, air, water, and soil pollution, atmospheric imbalances, ozone layer depletion, ecosystem degradation, biodiversity loss, food chain disruptions, deforestation, and chemical and radioactive pollution. The solution to these problems depends on the actions of the human beings who have caused them. (Huckle & Sterling, 1996).

As environmental issues persist, it has become evident that life as it exists today cannot be sustained indefinitely. Since these problems pose a global threat, global measures must be implemented. In recent years, international organizations have proposed solutions on various platforms, urging and, in some cases, compelling governments to adopt environmental protection measures (UN, 1973, 1987, 1993; UNESCO, 1978, 2015). The concept of sustainability has emerged as a response to these concerns and has gained widespread recognition. Sustainable development aims to meet current needs with minimal resource consumption, minimize environmental damage, and ensure a liveable world for future generations (Clark et al., 2001). Achieving this goal depends on raising environmental awareness among people.

Protecting the environment requires raising individuals with positive environmental attitudes and behaviours. Raising individuals with environmental sensitivity is only possible through education. Environmental education aims to inform individuals and society about existing environmental issues and their causes, raise awareness of potential dangers, and instill environmental consciousness. It aims to build a society with positive environmental values and ensure that they gain the will to take an active role in protecting and improving the environment (Alim, 2006). Schools are undoubtedly the most significant institutions for delivering this essential education. In this context, environmental education practices in schools play a crucial role in shaping the future (Davis & Elliott, 2023).

Sustainability

The planet we inhabit faces unprecedented threats to natural resources and the future of living species (Keleş, 2007). Humankind is the primary contributor to these threats. Over the past century, particularly following the Industrial Revolution, natural resources have been depleting

unprecedentedly (Malagila, Ntim & Orazalin, 2024). Consequently, efforts to find solutions to these environmental threats have intensified.

A review of the literature reveals that there is no clear definition of sustainability that is universally accepted. According to the Brundtland Report (1987), sustainability involves meeting present needs while carefully considering the needs of future generations. Kara (2023) defines sustainability as the challenge of addressing current requirements while ensuring that future generations inherit a world where they can meet their needs and sustain their lives. The concept of sustainability is often used alongside "sustainable development" and "sustainable growth" (Bolin et al., 2001). A review of various national and international definitions reveals a common emphasis on several critical aspects: the adverse effects of excessive greenhouse gas emissions resulting from human activities—especially those intensified after the Industrial Revolution—efforts to mitigate these impacts, reducing natural resource consumption, preserving biodiversity, decreasing energy use, and transitioning to renewable energy sources (Akpolat & Koyuncu, 2023; Deniz, 2017; Gollan, Hill & Wilkinson, 2001).

Since the second half of the 20th century, global environmental issues, particularly climate change, have been increasingly addressed on international platforms (Baykal, 2012; Goodland, 1995; Uğurlar, 2017). In this context, the "sustainability" concept first emerged at the United Nations Conference held in Stockholm in 1972 (UN, 1973). The widespread recognition of the term was facilitated by the Brundtland Report (1987) publication, and it gained even more prominence following the 1992 Rio Conference (UN, 1993).

Although sustainability is often understood primarily in its environmental dimension (Batra et al., 2024; Efeoğlu, 2014), its economic and social aspects are also extremely significant (Gedik, 2020). Essentially, sustainability is built upon three core dimensions. Ecological (environmental) sustainability involves the protection of soil, water, and air (Menteşe, 2017), the prevention of biodiversity loss (Boz, Eryılmaz & Kılıç, 2019; Özdemir, 2022), the reduction of natural resource consumption, and the minimization of greenhouse gas emissions (Baykal, 2012; Koyuncu & Nageye, 2020). Economic sustainability is an approach that promotes developing rational strategies while considering future scenarios using limited resources (Saldı & Selimoğlu, 2021). Social (societal) sustainability encompasses essential public services such as education, healthcare, and transportation, envisioning a participatory and pluralistic society (Gedik, 2020) while aiming to promote equality and improve overall quality of life (Keleş, 2007). The future of humanity, biodiversity, and our rapidly depleting planet ultimately depends on the sensitivity demonstrated towards environmental issues.

Sustainable Schools

In both national and international literature, the definition of a sustainable school is often associated with the design of educational buildings (Bahar, Tavşan & Tavşan, 2022; Dağ & Karademir, 2021; Egermier & Sashkin, 1992; Ferreira, Ryan & Tilbury, 2006). The architectural design of sustainable educational structures incorporates criteria such as the use of environmentally friendly and recyclable materials, maximizing natural light for illumination, ensuring clean air, reuse of rainwater by storing it, preventing noise pollution, and prioritizing both individual and community safety (Arslanoğlu, 2017; Kayıhan & Tönük, 2011; Tavşan &

Yanılmaz, 2019; Varlı, 2023). Schools designed with sustainable design are referred to as "Eco-Schools," "Green Schools," "Environmental Schools," or "ESD Schools" (Azazi & Uzma, 2022; Petegem, Vanhoof & Verhelst, 2023; Turhan, 2012). Schools that meet specific sustainability criteria are awarded prestigious certifications such as BREEAM and LEED (Dağ & Karademir, 2021; Kaya & Orhan, 2016).

The concept of sustainable schools also encompasses institutions with environmental sensitivities that emphasize water conservation, energy efficiency and conservation (Ferreira, Ryan & Tilbury, 2006), waste minimization and recycling (Tayanç & Tösten, 2024), and the protection and promotion of natural habitats (Debele et al., 2023). However, Güven (2023) emphasizes that the social and cultural environment should not be neglected. Effective use of financial resources is also characteristic of sustainable schools (Askell-Williams & Koh, 2020).

In UNESCO's (2015) Education-2030 report, it is emphasized that schools, as educational institutions, are expected to play a leading role in achieving sustainability-related goals such as gender equality, the right to education, and the elimination of discrimination. Therefore, sustainability practices are prioritized across all education levels, from preschool to higher education in modern educational approaches (Akgün, Erbil K., & Malçok, 2024; Bilgili & Topal, 2021). It is recommended that newly constructed educational buildings be designed by sustainable principles, while existing structures should be transformed into sustainable schools as much as possible (Gelişen & Güzelkokar, 2019; Öztürk, 2017).

Environmental Education

The existence and continuity of ecosystems rely on delicate balances formed by interconnected elements. Environmental issues disrupt these balances (Begum et al., 2022; Garipağaoğlu, 2020). Deniz et al. (2018) state that human activities, particularly population growth, cause environmental problems. Major environmental concerns include climate change driven by global warming, water, air, and soil pollution, rapid biodiversity loss (Ardoin & Bowers, 2020), ozone layer depletion (Çinikaya & Dere, 2023), and deforestation (Buz & Güzel, 2019), etc. In pursuit of increasing its comfort, humanity expands its ecological footprint by ensuring economic growth (Gencal & Selçuk, 2023).

As environmental problems have grown to unprecedented levels in recent years and their consequences have become observable even with the naked eye, efforts to protect the environment have increased (Harvey, 1976). According to Kiziroğlu (2023), one of the most effective ways to protect the environment is to take preventive measures. Changing individuals' attitudes and behaviors toward the environment can only be achieved through education (Karahan et al., 2014).

As a result of the change in the understanding of education in the world on the one hand and the increasing environmental problems on the other, many countries, especially European countries and the USA, have started to update their education programs following sustainable development goals (Ardoin et al., 2020; Glaudel et al., 2023; Helgeson & Roth, 1972; Öztemel, 2018; Rickinson, 2001). The concept of environmental education has been on the agenda in major international platforms, reports, declarations, and strategic documents. During the Intergovernmental Conference on Environmental Education held by UNEP and UNESCO in

Tbilisi in 1977, the fundamental principles, global role, and environmental education objectives were demonstrated (UNESCO, 1978). In addition to the responsibilities associated with United Nations membership, Turkey has to be in a process of harmonization with the environmental policies of the European Union (Altıkat et al., 2011; Can & Durmaz, 2021). According to the 1982 Constitution of the Republic of Turkey, the protection, improvement, and prevention of environmental pollution are among the state's and its citizens' duties (TBMM, 1982). Therefore, philosophical, ecological, economic, legal, and political reasons force us to take concrete actions in environmental education.

Since environmental education is a multidisciplinary field, it is addressed by various disciplines. Orion and Vasconcelos (2021) state that the Earth sciences play a key role in environmental education. In our country, environmental education objectives are included in Life Science courses in elementary schools, Social Studies and Science courses in secondary schools, Biology and Geography courses in high schools. Courses such as Environmental Education, Environmental Issues, and Environmental Sciences cover related topics at the Higher Education Level (Karahan et al., 2014). In 2015, MEB (The Turkish Ministry of National Education) added the "Elective Environmental Education Course" to the curriculum for secondary school students, and updated the name of the course to "Elective Environmental Education and Climate Change Course" in 2022 (MEB, 2022).

The primary aim of environmental education should be to provide individuals with the necessary awareness, knowledge, skills, and attitudes about the environment (Karahan et al., 2014). Considering the causes and consequences of environmental issues, this education should not be limited to students but should encompass all segments of society (Kiziroğlu, 2023). Schools, which are formal education institutions, are in extensive interaction with their social and physical environment. Environmental education in schools should be included at all levels of education, starting from the preschool period (Sağlam & Uzun, 2007; Sönmez, 2018). According to Çakır Arıca and Kağar (2018), it is important to raise ecologically literate individuals who consider nature in all of their actions from an early age, which is the most effective and efficient way to reduce our ecological footprint. Education systems should raise individuals with environmental consciousness and ethics. Countries that can raise environmentally responsible citizens can look to the future with more confidence (Kocalar, 2012).

Different perspectives exist on where and how environmental education should be conducted. Robertson (1994) argues that in order to acquire environmental skills, it would be effective to provide students with experiences through active participation by acting with a constructivist approach instead of memorizing environmental problems. As an alternative to formal education, Büyükyılmaz and Fidan (2015) suggest that businesses should develop environmentally friendly practices to set an example, Çiftçioğlu (2019) suggests that local governments should support environmental education, Deniz (2019) suggests environmental education through tourism, Kaçmaz (2021) suggests education intertwined with nature in green areas, and Kalaba (2021) suggests contributing to environmental protection through museum education. There are various examples of environmental education practices in schools, which are the main educational institutions.

Environmental Education Practices in Schools

The main purpose of environmental education is to protect the environment and, for this purpose, to gain desired, positive attitudes and behaviours related to the environment. Schools attempt to develop these competencies in students through various means. Environmental education begins in the preschool period (Ekici & Gülay, 2010), and themes related to environmental awareness are included in values education (Bardakçı & Mart, 2023). Within the scope of the formal education given in the classroom, Life Sciences, Social Studies, Science, Geography, and History curricula incorporate environmental learning objectives (Akınoğlu & Sarı, 2013). The Culture of Religion and Knowledge of Ethics course examines environmental issues within the framework of moral and religious responsibilities. (Çorbacı, 2023).

The Zero Waste Regulation, which was introduced in 2019, has imposed certain environmental obligations on educational institutions (Resmi Gazete, 2019). Waste sorting, recycling, and reuse were ensured by placing different coloured bins in schools. It is observed that this initiative has been effective in fostering recycling awareness among students. Activities in which students clean the school premises, gardens, and surrounding areas are also frequently encountered.

In recent years, the necessity to seek alternative ways to instill environmental awareness in students instead of classical methods such as making students memorize information within the curriculum has started to be emphasized (Rickinson, 2001; Verep & Vural, 2022). For instance, in early childhood, environmental education practices are implemented through music, where instruments are designed by transforming waste materials (Sungurtekin, 2001). Games are among the frequently utilized methods that provide active learning in environmental education (Chawla & Cushing, 2007). Other alternative environmental education practices include free observation, experiments, theater and drama activities, constructing models that generate renewable energy, feeding pets at school, building birdhouses, measuring carbon footprints, establishing environmental clubs, and collaborating with various non-governmental organizations (Bartosh et al., 2007; Cerrah et al., 2004; Güler, 2010; Keleş, 2007; Özdemir, 2010).

Güler (2010) emphasizes that for environmental education to be effective, school-based and extracurricular activities should complement and support each other. Many national and international researchers state that environmental education practices conducted in informal settings are more effective in raising awareness and fostering responsibility among students than in-class education practices (Altınbilek & Karaardıç, 2019; Bolat et al., 2020; Leijten et al., 2022). The school garden is often considered an ideal starting point for out-of-class environmental education practices. Gül and Kabacık (2021) report that permaculture practices in the school garden enable children to interact with nature, thereby increasing their appreciation for the environment. Planting saplings in the school garden is among the most common practices. Other outside-the-school environmental education activities include nature excursions, visits to open-air museums, organizing bicycle tours, camping, and scouting activities. Trips to museums, aquariums, and zoos attract students' attention significantly. (Bartosh et al., 2007). Based on the findings of the research, this study aims to explore the perspectives of teachers working in Sakarya province regarding

environmental education practices in schools from the perspective of sustainable schools. In line with this purpose, answers to the following questions were sought:

1) What are the views of teachers' working in Sakarya province regarding sustainable schools?

2) What are the opinions of teachers working in Sakarya province about the importance of environmental education?

3) What are the opinions of teachers working in Sakarya province about environmental education practices conducted in schools from the perspective of sustainable schools?

A review of national and international literature indicates that the concept of sustainability was first introduced in international studies (Bolin et al., 2001; Goodland, 1995; Gollan et al., 2001; Scoones, 2007). In recent years, studies on this topic have also increased in the national literature (Akpolat & Koyuncu, 2023; Gedik, 2020; Kara, 2023; Menteşe, 2017; Yeni, 2014). It is seen that these studies predominantly focus on the concepts of sustainable development and sustainable growth, explaining the issue with various sub-dimensions. Studies on sustainable schools generally focus on the structural design principles and features of educational buildings (Arslanoğlu, 2017; Bilgili & Topal, 2021; Gelişen & Güzelkokar, 2019; Güven, 2023; Kaya & Orhan, 2016; Kayıhan & Tönük, 2011; Turhan, 2012; Van Petegem et al., 2023; Varlı, 2023). Although it is seen that many national and international studies have examined environmental education comprehensively (Ardoin et al., 2020; Harvey, 1976; Karahan et al., 2014; Kiziroğlu, 2023; Kocalar, 2012; Rickinson, 2001; Sağlam & Uzun, 2007), there are fewer studies about environmental education practices in schools (Sungurtekin, 2001; Bartosh et al., 2007; Gül & Kabacık, 2021). However, there are not many studies examining environmental education practices in schools from the perspective of sustainable schools. In this regard, it can be said that the present study differentiates itself from similar research on a similar topic. This study, which examines teachers' perspectives on environmental education practices in schools from the viewpoint of sustainable schools, is considered valuable in terms of demonstrating how sustainability and environmental education goals are practically implemented. This study, which examines teachers' views on environmental education practices implemented in schools from the perspective of sustainable schools, is considered to have the potential to contribute to the literature by demonstrating the extent to which sustainability and environmental education goals are put into practice. The findings obtained from this research are expected to contribute to the implementation of future eco-friendly practices and are likely to serve as a valuable resource for subsequent studies.

Methodology

This section includes the research method, the sampling method used to determine participants, the tools used in collecting the research data, and the process of analysing the data obtained during the research.

Research Model

This study, which aims to determine the perspectives of teachers working in Sakarya province on environmental education practices in schools from the perspective of sustainable

schools, has been designed using phenomenology, a qualitative research method. Phenomenological research aims to describe the experiences of individuals affected by a specific phenomenon. In studies designed with the phenomenological method, the focus is placed on participants' experiences and opinions regarding the phenomenon under investigation (Ekiz, 2009; Patton, 2002). Data collection in studies designed with the phenomenological method is carried out through data collection tools such as interviews and observations with individuals who have directly experienced the phenomenon under study.

Study Group

This section includes an explanation of the snowball sampling method used to select participants, and the demographic information of the participants is given. The participants were selected using the snowball sampling method, which is one of the purposive sampling methods. According to this sampling method, during the data collection process, the researcher first interviews individuals who can provide relevant information about the research objective. Then, those participants are asked to recommend other individuals with similar characteristics who fit the research criteria. In the following process, the sample is completed with the suggestions of the participants (Creswell, 2007; Noy, 2008; Patton, 2002). In this study, the researchers explained the research objective to a teacher they were familiar with and asked whether they would be willing to participate. The participants in the study group were identified by including those who agreed to participate in the research, as well as additional individuals recommended by the initial participants who also consented to take part. The researchers ceased adding new participants once they determined, based on interviews and research diaries, that the data obtained in the interviews had reached saturation/began to repeat. The study group ultimately consisted of 20 teachers from various subject areas, genders, age groups, school types, and socio-economic backgrounds.

Teachers

Table 1 presents the demographic characteristics of the teachers who participated in the study.

Table 1: *Demographic Characteristics of Participants*

Participant Code	Gender	Age	Branch	Professional Seniority (Years)	Years at Current School
K1	M	32	Physical Education and Sports	9	4
K2	M	28	Living Languages and Dialects	1	1
K3	F	37	English	5	3
K4	F	25	Mathematics	2	1
K5	M	32	Primary School Teaching	8	1
K6	M	43	Primary School Teaching	19	1
K7	F	37	Social Studies	12	3
K8	M	34	Psychological Counseling	13	4

K9	M	35	Mathematics	12	5
K10	M	35	English	9	4
K11	F	44	Primary School Teaching	16	4
K12	F	43	Primary School Teaching	19	7
K13	M	39	English	15	7
K14	M	37	Science	9	5
K15	M	30	Social Studies	8	4
K16	M	42	Social Studies	13	11
K17	F	31	Culture of Religion and Knowledge of Ethics	10	3
K18	F	28	Primary School Teaching	3	3
K19	F	32	Mathematics	9	1
K20	F	32	Physical Education and Sports	5	2

When Table 1 is examined, it is seen that 9 of the teachers are female, 11 are male, and their average age is 34.8. The average teaching experience of the participants is 9.85 years, and their average experience at the school they currently work at is 3.7 years.

Data Collection Process

This section provides information about the semi-structured interviews and the participant information form used to collect data during the research process.

Semi-structured Interviews

For the semi-structured interviews used as a data collection tool, the researchers prepared semi-structured interview questions in accordance with the research questions and aimed to obtain in-depth information from the participants. Experts in qualitative research and sustainable schools were consulted during the development of the semi-structured interview questions. Based on feedback from 3 experts in the fields of educational administration and supervision, measurement and evaluation in education, and science education, the semi-structured interview questions were finalized by making various revisions. The semi-structured interview form consists of nine open-ended questions. The adjustments made in accordance with the expert opinions were made in the form of writing new questions, adding new follow-up questions, etc. Referential adequacy was strengthened by examining the visual materials provided by the participating teachers. The interviews were conducted between 01.07.2023 and 30.11.2023 in quiet locations suggested by the participants, where the researcher and the participant could converse one-on-one. A total of 319 minutes of audio recordings were obtained from 20 participants, with an average interview duration of approximately 16 minutes per participant. Whenever possible, the interviews were conducted at the schools where the teachers were employed, allowing the verbal data collected to be supported through observations. Prior to the interviews, participants were informed of the purpose of the study and their consent was obtained through a "Participant Informed Consent Form." The transcribed interviews resulted in a total of 74 pages.

Data Analysis

Data analysis in qualitative research is a complex and configurable process that involves working with the collected data, organizing them, sorting them into related units, combining them, and searching for commonalities in the data (Patton, 2002). Content analysis was used to analyze the collected data in this study. The MaxQDA software program was utilized during the analysis phase. The stages of the content analysis are as follows:

The collected data were prepared and organized for analysis. Semi-structured interview audio recordings were transcribed at this stage. In the second stage, all data obtained during the data collection process were read and examined to determine their collective meaning. Researchers prepared for coding in this stage. The coding process was implemented. After the collected data were coded, two main themes and four sub-themes were identified under each main theme. The method of reporting the main themes and sub-themes was determined. In the final stage of analysis, the findings were interpreted, and a conclusion was drawn regarding their overall meaning.

Ethics

Several measures were taken to ensure the credibility, consistency, and objectivity of the findings obtained during the research process. These measures can be listed as follows: The ethical obligations of the researchers and what was expected from the participants during the research process were presented to the participants both in written and verbal form. All participants' personal data was protected in accordance with the principles of confidentiality and anonymity. Experts were consulted in the process of preparing the semi-structured interview questions. The participants of the study were verbally informed about the general findings of the research, and their confirmations were obtained. An ethics committee permission document was obtained from the ethics committee of a university for this study.

Findings

In this section of the study, which aims to determine the perspectives of teachers working in Sakarya province regarding environmental education practices in schools, two main themes and four sub-themes under each main theme emerged from the analysis of the data obtained from the interviews. For the reporting of findings, tables with the frequency values for both main themes and sub-themes were included. The sub-themes categorized under the main themes of "Teachers' Views on Sustainable Schools" and "Teachers' Views on Environmental Education in Schools" were reported by including the views of the participants.

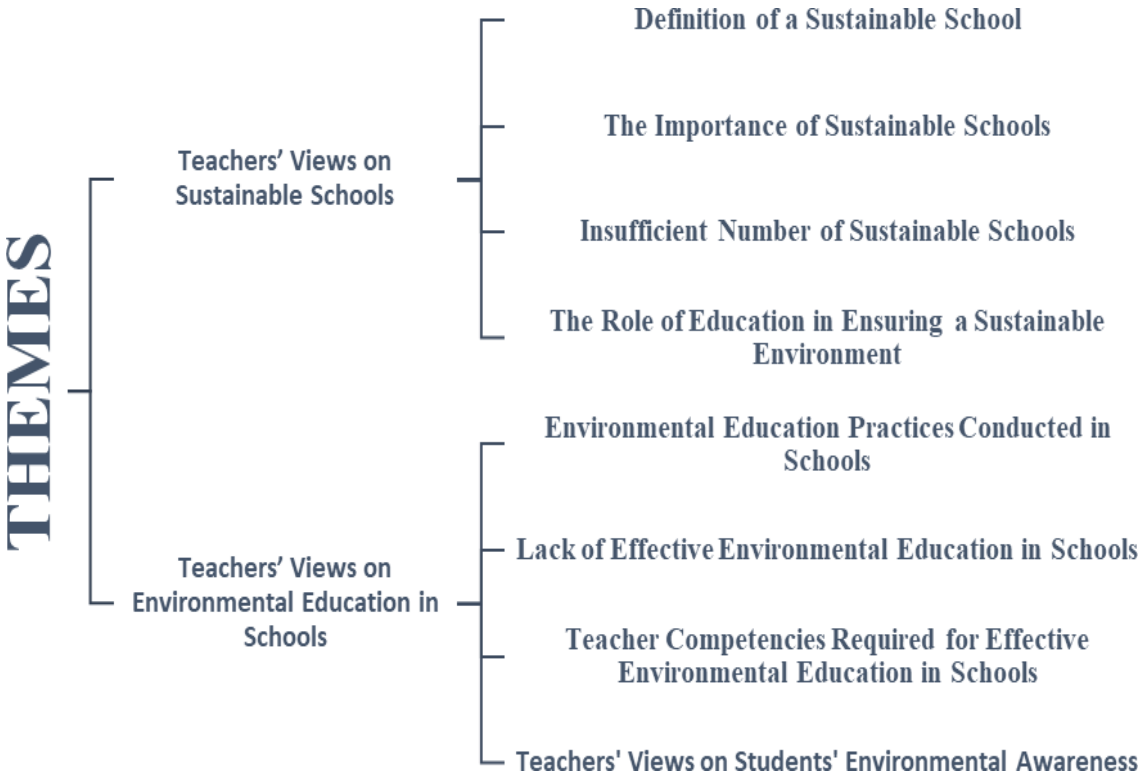

Figure 1: *Themes*

Teachers' Views on Sustainable Schools

The main theme and sub-themes of teachers' views on sustainable schools are presented in Table 2. The frequency values of the main theme and sub-themes are shown in the table, and direct quotations from the participants' views are presented as examples.

Table 2: *Teachers' Views on Sustainable Schools*

Themes	Sub Themes	*f*
Teachers' views on sustainable schools	The importance of sustainable schools	12
	The role of education in ensuring a sustainable environment	9
	Definition of a sustainable school	4
	Insufficient number of sustainable schools	2

As can be seen in Table 2, the most emphasized aspect by teachers was the importance of sustainable schools (12 participants), followed by the role of education in ensuring a sustainable environment (9 participants), the definition of a sustainable school (4 participants), and the

insufficient number of sustainable schools (2 participants). Participant opinions regarding these sub-themes are presented below.

The Importance of Sustainable Schools

The analysis of the data from the interviews revealed that participants predominantly emphasized the importance of sustainable schools. For instance, Participant K4 emphasized the importance of sustainable schools as follows: *"I think they make a significant contribution to nature in many aspects, such as building design, indoor temperature control, and benefiting from sufficient daylight."* Participant K1 emphasized the relationship between sustainable schools, technology, and society with the following statement: *"...moreover, I think that the formation of sustainable schools not only reduces the negative effects of the digital age that we live in but also lays the foundation for using technology efficiently and correctly. Schools are the most important institutions that can play a leading role in bringing these foundations and developments to society."* Participant K19 highlighted key features of sustainable schools with the following statement: *"...the installation of solar panels to generate part of the energy consumed, the separate collection of plastics and waste oils from school cafeterias, which can cause long-term environmental harm, ensuring cleanliness both inside and outside the school, designating a specific area in the schoolyard for agricultural activities, and carrying them out using stored rainwater—coordinating these activities at the school level while also ensuring that students adopt and implement them will be beneficial to society in the future."* Similarly, Participant K15 emphasized related aspects: *"...having dedicated small hobby or agricultural gardens in schools fosters students' respect for nature and supports production. Adequate sports facilities promote engagement in sports and, consequently, a healthy lifestyle. Posters and applications promoting recycling will be highly beneficial in motivating students. A sustainable school supports students' development in every aspect."* Participant K13, who stated that the main importance of sustainable schools lies in their impact on future generations, expressed this view with the following words: *"Instilling this awareness in young children is crucial for leaving a happier and healthier environment for future generations."*

The Role of Education in Ensuring a Sustainable Environment

Nine participants in the study stated that education plays a crucial role in ensuring a sustainable environment. Regarding this issue, Participant K5 expressed their views as follows: *"We can instill sustainable environmental awareness through education. However, it must be done with the right education and the right methods. For sustainable environmental awareness, it is not enough to simply say, 'Please be mindful of our environment for future generations.' There should be images, posters, films, advertisements, enactments, and theatre performances. Such activities should be carried out and encouraged. Active responsibilities should be assigned."* Participant K11 stated that a sustainable environment is only possible through education. They expressed this view as follows: *"Raising conscious individuals will lead to a more considerate society in the future. Since such an educated and conscious society will be more sensitive to the environment, it will facilitate the achievement of a sustainable environment."* Participant K1 highlighted that education plays the most crucial role in this process, stating: *"As with all other developments and changes, although learning a behaviour and making it a life philosophy begins in the family, laying its foundations and making it permanent happens through education."* Participant K2, who stated that sustainability should be viewed from a broader perspective, expressed their thoughts as follows: *'Sustainability is one of the most significant issues of both the*

present and the future, even if we are not fully aware of it. For a sustainable world, or even from a broader perspective, a sustainable universe (as space pollution will be one of the fundamental problems of the next century), individual efforts are very valuable but not sufficient. Therefore, efforts must be collective and transformed into a societal effort. One of the most effective ways to achieve this transformation is to present this phenomenon to society as an outcome of the education system."

Definition of a Sustainable School

The concept of a "sustainable school," which has emerged recently and is relatively new in the literature, was described by the participants as follows:

Participant K10 defined a sustainable school with the following statement: *"A sustainable school is a school that is aware of the limitations of the resources provided to it and, in this context, can utilize these resources economically."* Participant K1 expressed their thoughts on the same topic as follows: *"Sustainability and sustainable schools are among the most important developments that can enable the integration of global warming, which is one of the biggest problems of our time, into education."* Participant K3 defined sustainable schools as follows: *"Schools where the quality of students and the opportunities they have, as well as the administrative and teaching staff, are above a certain standard, and where the educational process reflects the quality of the school."* Participant K5, who mentioned that they were newly introduced to this concept, stated, *"To be honest, I had never heard of the term "sustainable school" until I began my graduate studies. Even if I had overheard it, I didn't understand it."*

Insufficient Number of Sustainable Schools

Two teachers who participated in the study mentioned that the number and qualifications of sustainable schools are insufficient. Participant K4 expressed their thoughts on this issue as follows: *"...as the number of sustainable schools is low in our country, their numbers should be increased."* Participant K11 emphasized this insufficiency with the following statement: *"Although the idea of sustainable schools seems very promising, it is not implemented in practice. Neither the old school buildings nor the newly constructed ones, which are built based on existing projects, are suitable for this purpose."*

Teachers' Views on Environmental Education in Schools

Table 3: *Teachers' Views on Environmental Education in Schools*

Themes	Sub Themes	*f*
Teachers' views on environmental education in schools	Teacher competencies required for effective environmental education in schools	12
	Environmental education practices conducted in schools	9
	Teachers' views on students' environmental awareness	9
	Lack of effective environmental education in schools	3

Table 3 presents the main themes and sub-themes related to teachers' views on environmental education in schools. The frequencies associated with these themes are also indicated. Direct quotations from participants' statements during the interviews are then presented.

As can be seen in Table 3, the most emphasized aspect by teachers was the teacher competencies required for effective environmental education in schools (12 participants), followed by environmental education practices conducted in schools and teachers' views on students' environmental awareness (9 participants each). Lastly, the views on the lack of effective environmental education in schools were mentioned (3 participants). The opinions on these four sub-themes are presented below.

Teacher Competencies Required for Effective Environmental Education in Schools

The analysis of the data obtained from interviews with participating teachers revealed that teachers mentioned certain competencies necessary for providing environmental education in schools. For instance, Participant K15 expressed their thoughts on this issue as follows: *"First and foremost, teachers should set an example for students inside the school, in the schoolyard, and outside the school. Rather than dictating information about the environment to students, teachers should adopt a persuasive approach."* Similarly, Participant K11 emphasized that teachers should act as role models, stating: *"In order to instill a behaviour in someone, we must first fully adopt and practice that behaviour ourselves. If they see that we also implement what we say, they will embrace it more."* Participant K16 stated, *"The earlier we teach environmental awareness to children, the more permanent it will be. However, teachers must have a high level of self-efficacy and a strong sense of responsibility in this regard. Our ability to convey our knowledge about environmental awareness to students must be well-developed."* Participant K13 highlighted the teacher competencies they considered necessary as follows: *"...they must have strong social relationships. They should be confident in this regard. They must have a high level of environmental sensitivity."* Participant K3 expressed their views as follows: *"Every teacher should be an environmentalist, a nature lover, and an expert in this field."* Another opinion highlighting the necessity of teacher training in this regard came from Participant K4: *"Every teacher should regularly participate in environmental awareness training to set an example for students."*

Environmental Education Practices Conducted in Schools

Participant K14 provided examples of environmental education practices conducted in their school as follows: *"Environmental education practices conducted in our school include teaching environmental awareness in lessons, engaging in afforestation activities, maintaining cleanliness both inside and outside the school, organizing nature walks in picnic areas, and placing recycling bins for paper, plastic, and batteries. First and foremost, we strive to prevent unnecessary lights from being left on in schools and to minimize water wastage in restrooms. As part of the Zero Waste Project, we prioritize recycling in schools. We show videos on sustainable environments in accordance with our lesson objectives. We also work on instilling the habit of keeping our surroundings clean both inside and outside the classroom."* Participant K18 provided examples of environmental education practices conducted in their school as follows: *"In order to help students understand that something is not just trash but waste and that it is recyclable, an "Environmental Club" was established, and informative posters were put up on the walls inside the school. A theatre play is performed at our school every month. Two of the plays staged throughout the year were*

related to recycling, waste, and similar topics. Since then, there have been noticeable differences in our students." Participant K12 stated: *"In our school, waste separation, improving our surroundings (such as a greenhouse in the garden), afforestation, reducing paper towel usage, organizing nature trips, and creating libraries from recycled materials are among the activities carried out. We have put up 'Please turn off' signs on power sockets, disposed of waste paper in recycling bins, and organized recycling activities (such as making pencil holders from tomato paste cans). Additionally, we have incorporated poster projects, the clean classroom project, and the screening of TV programs related to cleanliness and waste prevention into our activities."* Participant K20 expressed their thoughts as follows: *"I believe that everything done through hands-on activities is important for raising students' awareness and for the contributions they will make both to themselves and to society in the future. Currently, we are implementing the 'Class of the Month' and 'Student of the Month' practices."* From these interviews, it is understood that environmental education in the schools where the teachers work predominantly includes conservation and recycling practices.

Teachers' Views on Students' Environmental Awareness

The majority of the teachers who participated in the study expressed their views on students' environmental awareness. All of those who shared their opinions stated that students lack sufficient environmental awareness and explained the reasons behind this. For instance, Participant K4 stated their opinion as follows: *"The practices aimed at instilling environmental awareness in schools are quite insufficient because this issue is not taken seriously in schools. Another issue is that the waste bins placed in schools to promote environmental awareness are not used properly, and since no sanctions are imposed when students litter, they continue to do so repeatedly. For this reason, environmental awareness should be approached seriously in schools, and necessary measures should be strictly enforced against those who waste energy, pollute, and harm the environment. These measures should serve as a deterrent. Since the penalties generally imposed are not deterrent, all of the practices conducted remain ineffective."* Participant K20 expressed their thoughts on this issue as follows: *"Environmental awareness should be instilled in individuals at an early age. Unfortunately, as a high school teacher, I work with students who did not develop this awareness at a young age. At our school, progress on this issue does not extend beyond teachers' guidance and discussions with students about the environment, nature, and pollution. The long-standing belief that protecting the environment is merely about collecting trash still persists. I believe that environmental cleanliness and the upkeep of the schoolyard should be carried out in collaboration with student clubs."* Participant K7 expressed their views on this issue as follows: *"…education is a whole. Since we have neglected many parts of this whole over time, it becomes very difficult to complete them later in life. Our education system is more focused on instruction rather than education itself, which makes us unable to comprehend long-term goals such as environmental awareness. The consequences of not acquiring environmental awareness are not immediately visible; instead, they emerge years or even centuries later, which is why people do not take it seriously. Moreover, in the geography we live in, students struggle to meet even their most basic individual needs, so societal needs such as environmental awareness are not prioritized."* Participant K10 stated as follows: *"The individual and social responsibilities assigned to students to protect the environment are not sufficient. In this regard, parents' attitudes also play a decisive role. Parents who want their children to progress academically consider such practices a burden and oppose them."*

Lack of Effective Environmental Education in Schools

Participant K17 emphasized that environmental education is not sufficiently included in the curriculum and its implementation and stated as follows: *"The environmental education included in the curriculum is definitely insufficient. However, expecting schools alone to be responsible for this is also incorrect. Awareness that is not acquired within the family can only be maintained while students are with their teachers and peers. Once they are no longer in that environment, they will revert to their usual habits. Therefore, trying to instill environmental awareness solely through school programs is a futile effort. These practices remain confined to the classroom or school and do not extend to the broader environment. In order to change this situation, efforts should begin with students' immediate surroundings and gradually expand to other areas, and eventually involve families."* Participant K8 emphasized that practice is more effective than theory, stating: *"I do not believe that theoretical education makes a significant contribution to children. Certain stereotypical phrases emerge among children, such as global warming and environmental pollution. However, theoretical education does not have a real impact on them. The subject needs to be addressed through practical applications. Expressions in the curriculum like 'knows' and 'becomes aware of' should be updated to 'does' and 'performs.' Instead of the statement 'Understands the importance of keeping their environment clean,' it should be 'Carries out the necessary activities to keep their environment clean together with their teacher.' Moreover, teachers struggle to implement such practices due to the heavy curriculum they are required to cover. In addition, they are not assigned any specific duties related to this subject. Under these circumstances, teachers do not see a need to take the initiative and engage in such practices on their own."* Participant K15 highlighted the lack of effective environmental education in schools, stating: *"Educational objectives are predominantly academically oriented, and insufficient importance is given to the environment and environmental education. The practices implemented in schools are often superficial and lack proper attention. Learning through hands-on experience could be a more effective way for students to grasp the significance of environmental issues. Environmental education could be given greater emphasis in textbooks. Additionally, the elective environmental education course could be promoted and made more appealing to encourage students to choose it."*

Conclusion and Discussion

It has been observed that the teachers participating in the study defined the concepts of "Sustainability" and "Sustainable School" in the context of preventing environmental pollution, mitigating global warming and climate change, using resources economically, and leaving a cleaner world for future generations. Based on this, it is thought that teachers consider the concept of sustainability important and find it valuable in terms of environmental protection. When examining national and international literature, it is understood that sustainability is a concept with various dimensions (environmental, economic, social, etc.). (Adiller et al., 2011; Batra et al., 2024; Büyükkeklik, 2008). However, the fact that the teachers in this study primarily referred to the ecological dimension of sustainability suggests that they may not have a comprehensive understanding of all aspects of sustainability. Considering the critical role of teachers in implementing sustainability through schools, this is considered a notable deficiency. Similarly, in their study examining the importance of teachers in sustainability education, Uitto et al. (2017) found that teachers were more familiar with the environmental dimension compared to other dimensions.

When the findings regarding the importance of sustainable schools are examined, it becomes evident that the majority of teachers emphasized the societal implications of practices to be implemented in these schools, particularly for future generations. The findings of this study suggest that raising awareness among the generations being educated in today's institutions is perceived as a prerequisite for achieving the individual and societal outcomes targeted in terms of sustainability. It is thought that teachers foresee schools playing a leading role in raising public awareness. Similarly, Kayıhan and Tönük (2011) stated that a new sustainability-based restructuring in schools would indirectly raise awareness not only among students residing in educational buildings but also among their immediate surroundings (families and other individuals in the nearby community). Ferreira et al. (2006) emphasize that all school sustainability initiatives operating worldwide highlight the capacity of schools to innovate and demonstrate changes in practice for a better future. They also assert that active participation in sustainability occurs not only within the school (teachers, students, administration, etc.) but also between schools and society (organizations, business/industry, and governments). In this context, the findings of the present study align with research results indicating that schools play an influential role in achieving societal goals.

Another finding of the study is that teachers believe education plays a significant role in ensuring a sustainable environment. Research indicates that sustainability can be taught and promoted through education (Arslanoğlu, 2017; Bektaş, Kaya, & Taşçı, 2021; Turhan, 2012). In recent years, the Turkish Ministry of National Education (MEB) has incorporated the concept of sustainability into educational programs and implemented local and international projects on issues such as human rights, the environment, and equal opportunities in access to education (Artvinli, Çobanoğlu, & Kaya, 2011). However, the unanimous agreement among the teachers participating in the study regarding the inadequacy of environmental education presents a thought-provoking contradiction. Furthermore, teachers' views that the necessary education for raising environmentally conscious generations should begin within the family during preschool education align with the findings of Van Petegem et al. (2023), who emphasized the active role of families in the education process. This is because environmental awareness that is not instilled at an early age becomes significantly more difficult to develop later in life (Gülay, 2011).

Teachers who believe that the number and quality of sustainable schools in our country are insufficient have stated that adapting existing buildings to meet sustainability criteria is highly challenging due to economic, physical, administrative, and technical barriers. Similarly, Turhan (2012), in his research on the transformation of schools into sustainable schools in Turkey, noted that while some countries have long been engaged in sustainability efforts, studies on this issue in Turkey are relatively new and limited, underscoring the need for their rapid expansion.

Participants stated that teachers need to possess certain competencies to provide effective environmental education in schools. These competencies include being role models, setting good examples for their students and surroundings, being persuasive, having a sense of self-efficacy and responsibility, having strong social relationships, being self-confident, being sensitive to environmental issues, being experts in their field, and having received training on the subject. When examining studies conducted in national and international literature on teacher competencies in environmental education, it has been found that teachers should receive quality

education (Cerrah et al., 2004; Güler, 2010; Günindi, 2010; Uitto & Saloranta, 2017), have a high level of awareness (Bulut & Çakmak, 2018), be environmentally friendly and sensitive to environmental issues (Günindi, 2010), and serve as role models for students through their practices (Çimen & Yılmaz, 2014; Salīte, 2008). Based on these findings, it can be concluded that success in environmental education depends on the presence of expert and competent teachers.

Participants stated that teachers need to possess certain competencies to provide effective environmental education in schools. These include serving as role models, setting positive examples for students and their surroundings, being persuasive, demonstrating self-efficacy and responsibility, maintaining strong social relationships, showing confidence, being environmentally conscious, having expertise in their field, and receiving relevant training. Studies in national and international literature highlight that teachers should receive quality education (Cerrah et al., 2004; Güler, 2010; Günindi, 2010; Uitto & Saloranta, 2017), develop high awareness levels (Bulut & Çakmak, 2018), adopt environmentally friendly behaviors (Günindi, 2010), and serve as role models for students through their actions (Çimen & Yılmaz, 2014; Salīte, 2008). Based on these findings, success in environmental education largely depends on the presence of knowledgeable and competent teachers. It is recognized that the presence of a positive and encouraging school culture is essential, and that this culture should be established and maintained by teachers.

The findings of this study indicate that teachers employ various methods and techniques for environmental education, incorporating both theoretical and practical applications. It can be inferred that teachers choose different methods depending on the resources available within their schools and surroundings. Some studies in the literature that examine environmental education curricula suggest that the predominantly theoretical nature of learning objectives in the curriculum leads to a lack of emphasis on practical applications (Artun & Özsevgeç, 2015; Azrak, 2022). The fact that these objectives remain at the knowledge level increases the importance of teacher-led initiatives and contributes to variations in environmental education practices across schools. Indeed, teachers reported implementing a wide range of activities. In line with numerous studies emphasizing that student-centred activities are more effective in education (Kiziroğlu, 2023; Metzger & Parry, 2023; Orion & Vasconcelos, 2021; Sağlam & Uzun, 2007), it has been observed that the teachers in this study included activities in which students played an active role. Among the most common activities conducted are waste reduction, energy conservation, and recycling practices. Additionally, activities such as assigning students responsibility for cleaning designated areas, establishing environmental clubs, carrying out social responsibility projects, organizing afforestation efforts, nature walks, and picnics, and keeping pets at school are thought to be preferred due to their role in fostering a sense of individual responsibility among students. Kabaday and Veisson (2018) also highlight the effectiveness of student-centred approaches in professional teachers' transfer of knowledge and skills. Furthermore, teachers mentioned the implementation of reward-based systems, such as selecting the "Class of the Month" or "Student of the Month," to reinforce positive behaviours. Other examples of environmental education practices include displaying posters and other visual materials on school bulletin boards, presentations, videos, seminars, conferences, as well as theatre and drama activities (Çavuş, Kaplan & Topsakal, 2013; Çimen & Yılmaz, 2014). These practices aim to enhance student engagement through multisensory experiences, thereby reinforcing long-term learning.

Numerous studies emphasize that environmental education and the development of environmental awareness should begin within the family (Gülay, 2011; Günindi, 2010; Morgil & Yücel, 1999; Kabaday & Veisson, 2018). Although teachers recognize the benefits of introducing environmental education at home and highlight the importance of school-community collaboration, their limited implementation of such practices in reality is a noteworthy issue. It can be inferred that the teachers participating in this study do not engage in collaboration with families, other official institutions, colleagues, or non-governmental organizations due to constraints such as limited time, lack of resources, and insufficient knowledge. However, research has demonstrated that informal learning environments outside of school are highly effective in fostering environmental awareness among students (Çavuş, Kaplan & Topsakal, 2013).

Research indicates that an environmentally conscious society is a prerequisite for sustainability (Bulut & Çakmak, 2018). The key to fostering environmental awareness among students lies in delivering a structured and effective environmental education. To achieve this, teachers responsible for instilling environmental awareness must enhance their competencies and update their knowledge through in-service training during their higher education and professional careers (Cebrian & Junyent, 2015; Cerrah et al., 2004; Sağlam & Uzun, 2007). Furthermore, appropriate curricula, materials, methods, and techniques should be effectively implemented by experts at all levels of formal education, starting from the preschool period (Kahyaoğlu, 2016; Morgil & Yücel, 1999). However, the consensus among the teachers in this study that students lack sufficient environmental awareness suggests that environmental education provided in schools is not as effective as desired. Teachers' perspectives on the causes of this issue align with studies emphasizing the inadequacies of curriculum content (Sağlam & Uzun, 2007; Artun & Özsevgeç, 2015) but diverge from the findings of the Sustainable Development Report prepared by the Ministry of Development (2012). Teachers' views that environmental education is more effective when it begins in preschool and within the family correspond with the findings of Günindi (2010), who noted that the transformation of attitudes into behaviours requires time. Additionally, teachers expressed that environmental education should not be limited to school settings (Çavuş, Kaplan & Topsakal, 2013) and emphasized that outdoor activities, particularly those conducted in nature, contribute to long-term learning (Güler, 2010).

When the findings of this study are evaluated as a whole, it is evident that a stronger link between environmental education and sustainability needs to be established within the education system of our country. Based on these findings, the following recommendations can be proposed:

- Although environmental education is a more established and familiar concept, sustainability and sustainable schools are relatively new concepts, and further research in these fields would be beneficial.
- It is important to ensure that teachers, as the key actors in education, have comprehensive knowledge about sustainable schools. Pre-service training should be provided to prospective teachers, and in-service training should be offered to current teachers to increase their awareness and competencies in this area.
- It is recommended to increase both the number and quality of sustainable schools in our country. For this, newly constructed educational buildings should be designed in

accordance with sustainability criteria, and existing structures should be transformed as much as possible within the limits of available resources.

- To ensure that sustainability is understood rapidly and deeply by all segments of society, educational institutions should engage in effective cooperation with both public and private organizations.
- Environmental education should not be limited to a small number of objectives in certain courses; instead, its scope should be expanded through an interdisciplinary approach. Since classical and theoretical education on environmental protection has proven insufficient, emphasis should be placed on projects and activities in which students are actively involved, thereby transforming learning into behavior.
- To instill environmental awareness from an early age, family education programs should be organized, and all segments of society should be engaged as stakeholders through social responsibility projects.
- As this is a qualitative study based on subjective data, future researchers should examine the topic using quantitative and mixed research methods. Additionally, studying the subject with larger participant groups may provide more in-depth insights.

References

Adiller, L., Durmaz, V., & Yalçınkaya, A., (2011). Sürdürülebilir kalkınma ve kurumsal sürdürülebilirlik için yeni ölçümleme: Üçlü performans. *Uluslararası*, *9*, 23-25.

Akgün, A., Duruk, Ü., & Gülmez Güngörmez, H. (2016). Ortaokul öğrencilerinin çevre eğitimi kavramına yönelik metaforları. *Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi*, *28*, 215-224.

Akınoğlu, O., & Sarı, A. (2013). İlköğretim programlarında çevre eğitimi. *Marmara Üniversitesi Atatürk Eğitim Fakültesi Eğitim Bilimleri Dergisi*, *30*(30), 5-29.

Akpolat, O., & Koyuncu, N. (2023). Sürdürülebilirlik açısından teknoloji, çevre ve insan etkileşimi. *Ulusal Çevre Bilimleri Araştırma Dergisi*, *6*(1), 46-60.

Alım, M. (2006). Avrupa Birliği üyelik sürecinde Türkiye'de çevre ve ilköğretimde çevre eğitimi. *Kastamonu eğitim dergisi*, *14*(2), 599-616.

Alpaslan, B., Kaya, A. & Şen, H. (2018). Sürdürülebilirlik üzerine tarihsel ve güncel bir perspektif. *Ekonomik Yaklasim*, *29*(107).

Altıkat, A., Bayram, T. T., & Torun, F. E. (2011). Avrupa Birliği ve Türkiye'de Çevre Politikaları. *Journal of the Institute of Science and Technology*, *1*(1), 33-38.

Altınbilek, G., & Karaardıç, H. (2019). Kuş halkalama istasyonlarının çevre eğitimi açısından önemi. *Doğanın Sesi*, (4), 75-82.

Ardoin, N. M., & Bowers, A. W. (2020). Early childhood environmental education: A systematic review of the research literature. *Educational Research Review*, *31*, 100-353.

Ardoin, N. M., Bowers, A. W., & Gaillard, E. (2020). Environmental education outcomes for conservation: A systematic review. *Biological conservation*, *241*, 108224.

Arslanoğlu, Ö. (2017). Türkiye için yeni nesil eğitim binaları ve sessiz okul ilkesi için fiziki hazırlıklar. *Harran Maarif Dergisi*, *2*(2), 1-17.

Artun, H., & Özsevgeç, T. (2015). Çevre eğitimi modüler öğretim programının akademik başarı üzerindeki etkisi. *HAYEF Journal of Education*, *12*(1), 9-22.

Artun, H., Temur, A., Tozlu, İ., & Ötün, Y. (2015). Ortaokul öğrencilerinin çevre eğitimine yönelik tutumlarının değerlendirilmesi. *Van Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, *12*(1), 27-48.

Artvinli, E., Çobanoğlu, M., & Kaya, N., (2011). Sürdürülebilir kalkınma için Türkiye'de ve dünyada çevre eğitimi çalışmaları. 6. *Ulusal Coğrafya Sempozyumu*, *3*(5), 407-417.

Askell-Williams, H., & Koh, G. A. (2020). Enhancing the sustainability of school improvement initiatives. *School effectiveness and school improvement*, *31*(4), 660-678.

Ateş, H. (2018). Fen bilgisi ve sosyal bilgiler öğretmen adaylarının sürdürülebilir tüketim davranışlarının ve bilgi düzeylerinin araştırılması. *Uludağ Üniversitesi Eğitim Fakültesi Dergisi*, *31*(2), 507-531.

Azazi, H., & Uzma,O. (2022). Türkiye'de yeşil ekonomi, yeşil işler ve yeşil istihdam. *Biga İktisadi ve İdari Bilimler Fakültesi Dergisi*, *3*(2), 93-100.

Azrak, Y. (2022). Sosyal Bilgiler dersinde sürdürülebilir kalkınma: Sosyal Bilgiler öğretmenlerinin ve ortaokul öğrencilerinin görüşleri. *e-Kafkas Journal of Educational Research*, *9*(3), 792-835.

Bahar, Z., Tavşan, C., & Tavşan, F. (2022). Sürdürülebilirlik kapsamında yağmur suyu toplama sistemli pavilyonlar. *Kent Akademisi*, *15*(2), 896-915.

Bardakçı, M. N., Mart, M., (2023). Okul dışı öğrenme ortamlarındaki değerler eğitiminin okul öncesi eğitimde uygulanması açısından değerlendirilmesi: Sistematik literatür taraması. *Temel Eğitim Araştırmaları Dergisi*, *3*(2), 52-71.

Bartosh, O., Glaser, L., Schoellhamer, M., Thumlert, C., & Wheeler, G. (2007). *Environmental education report: Empirical evidence, exemplary models, and recommendations on the ımpact of environmental education on k-12 students.* Washington Office of Superintendent of Public Instruction.

Batra, I., Garza-Reyes, J. A., Kaswan, M. S., Malik, A., Sharma, C., & Sharma, S.(2024). Industrial revolution and environmental sustainability: An analytical interpretation of research constituents in Industry 4.0. *International Journal of Lean Six Sigma*, *15*(1), 22-49.

Baykal, T. (2012). Enerji ve çevre: Alternatif enerji kaynaklarının incelenmesi-Energy and the environment: A review of alternative energy sources. *Öneri Dergisi*, *9*(33), 237-244.

Begum, A., Liu, J., Mamdouh, A., & Qayum, H. (2022). Environmental and moral education for effective environmentalism: An ideological and philosophical approach. *International Journal of Environmental Research and Public Health*, *19*(23), 15549.

Bektaş, F. L. Ö., Kaya, H. U., & Taşçı, G., (2021). Eğitimde yeni bir perspektif: Bahçe temelli eğitim yaklaşımı. *Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi*, *9*(2), 529-540.

Bilgili, M. Y., & Topal, A. (2021). Sürdürülebilir yükseköğretim kurumları oluşturulmasında Talloires Deklarasyonu'nun rolü ve önemi. *Yükseköğretim ve Bilim Dergisi*, *11*(2), 417-424.

Bogdan, R.C., & Biklen, S.K. (2007). *Qualitative research for education an ıntroduction to theories and methods* (5. Baskı). USA: Pearson.

Bolat, E. Y., Gölcük, İ., & Yılmaz, S. (2020). Erken çocukluk döneminde uygulanan çevre eğitim programının çocukların çevreye karşı tutumları üzerindeki etkisi. *Van Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, *17*(1), 557-578.

Bolin, B., Clark, W., Corell, R., Dickson, N., Faucheux, S., Gallopín, G., Grubler, A., Hall, J., Huntley, B., Jager, J., Jaeger, C., Jodha, N., Kasperson, R., Kates, R., Lowe, I., Mabogunje, A., Matson, P., Mccarthy, J., Schellnhuber, H., Svedin, U. (2001). Sustainability Science, *Science. 292*. 641-642.

Boz, İ., Eryılmaz, G. A., & Kılıç, O. (2019). Türkiye'de organik tarım ve iyi tarım uygulamalarının ekonomik, sosyal ve çevresel sürdürülebilirlik açısından değerlendirilmesi. *Yüzüncü Yıl University Journal of Agricultural Sciences*, *29*(2), 352-361.

Brundtland Report. (1987). *Our common future: The world commission on environment and development's report.* United Nations Publication. https://www.are.admin.ch/are/en/home/media/publications/sustainable-development/brundtland-report.html

Bulut, B., & Çakmak, Z. (2018). Sürdürülebilir kalkınma eğitimi ve öğretim programlarına yansımaları. *Uluslararası Türkçe Edebiyat Kültür Eğitim (TEKE) Dergisi*, *7*(4), 2680-2697.

Buz, S., & Güzel, B. (2019). "Yeşil" yoksulluk, çevresel adalet ve sosyal hizmet. *Toplum ve Sosyal Hizmet*, *30*(3), 1052-1069.

Büyükkeklik, A. E. A. (2008). Sürdürülebilir kalkınmanın ekonomik çevre boyutları açısından atık yönetimi ve e-atıklar. *Niğde Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *1*(2), 19.

Büyükyılmaz, O., & Fidan, Y. (2015). Kurumsal sosyal sorumluluk: Kavramsal bir bakış. *Business & Management Studies: An International Journal*, *3*(3), 364-381.

Cebrián, G., & Junyent, M. (2015). Competencies in education for sustainable development: Exploring the student teachers' views. *Sustainability*, *7*(3), 2768-2786.

Cerrah, L., Saka, A., Şahin, B., & Şahin, N. F. (2004). Yüksek öğretimde öğrenci merkezli çevre eğitimi dersine yönelik bir uygulama. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi*, *24*(3), 113-128.

Cerrah, L., Saka, A., Şahin, B., & Şahin, N. F. (2004). Yükseköğretimde öğrenci merkezli çevre eğitimi dersine yönelik bir uygulama. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi*, *24*(3).

Chawla, L., & Cushing, D. F. (2007). Education for strategic environmental behavior. *Environmental education research*, *13*(4), 437-452.

Clark, W. C., Corell, R., Hall, J. M., Jaeger, C. C., Kates, R. W., Lowe, I., & Svedin, U. (2001). Sustainability science. *Science*, *292*(5517), 641-642.

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2. Baskı). USA: SAGE Publications.

Çakır Arıca, Ş., & Kağar, C. (2018). Gelecek nesillere yaşanabilir bir dünya bırakmanın anahtarı: Ekolojik okuryazarlık. *Doğanın Sesi*, (2), 31-42.

Çavuş, R., Kaplan, A. Ö., & Topsakal, Ü. U. (2013). İnformal öğrenme ortamlarının çevre bilinci kazandırmasına ilişkin öğretmen görüşleri: Kocaeli Bilgevleri örneği. *Pegem Eğitim Ve Öğretim Dergisi*, *3*(1), 15-26.

Çiftçioğlu, A. (2019). Türkiye'de yerel yönetimler ve çevre sorunlarının çözümündeki sorumlulukları, rolleri ve önemi. *Al Farabi Uluslararası Sosyal Bilimler Dergisi*, *3*(1), 117-128.

Çimen, O., & Yılmaz, M. (2014). Dönüşümsel öğrenme kuramına dayalı çevre eğitiminin biyoloji öğretmen adaylarının çevre sorunlarına yönelik algılarına etkisi. *Bartın University Journal of Faculty of Education*, *3*(1), 339-359.

Çinikaya, C., & Dere, İ. (2023). Tiflis bildirgesi ve BM 2030 sürdürülebilir kalkınma amaçlarının çevre eğitimi ve iklim değişikliği dersi öğretim programına yansımaları. *Ordu Üniversitesi Sosyal Bilimler Enstitüsü Sosyal Bilimler Araştırmaları Dergisi*, *13*(1), 1343-1366.

Çorbacı, O. K. (2023). DKAB öğretim programı ekseninde çevre bilinci. *Pamukkale Üniversitesi İlahiyat Fakültesi Dergisi*, *10*(1), 168-191.

Dağ, A., & Karademir, A. Ç. (2021). Sürdürülebilirlik uygulaması olarak yeşil bina ve Leed Sertifikasyonu üzerine Türkiye'de inşaat sektöründe bir çalışma. *Akademia Doğa ve İnsan Bilimleri Dergisi*, *7*(1), 63-83.

Davis, J., & Elliott, S. (2023). *Young children and the environment: Early education for sustainability*. Cambridge University Press.

Debele, S., Emygdio, A. P. M., Kumar, P., Pfautsch, S., Rawat, N., Sahani, J., ... & Tiwari, A. (2023). Using empirical science education in schools to improve climate change literacy. *Renewable and Sustainable Energy Reviews*, *178*(1), 113-232.

Deniz, B., Göktuğ, T. H., & Kılıçaslan, Ç. (2018). Çevre ve doğa koruma konusunda gençlik platformları. *OPUS International Journal of Society Researches*, *8*(1), 414-440.

Deniz, T. (2017). Hızlı dünyada sürdürülebilir mekânlar: Sakin kentler. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi*, *6*(3), 1399-1412.

Deniz, T. (2019). Turizm ve biyoçeşitlilik. *Safran Kültür ve Turizm Araştırmaları Dergisi*, *2*(3), 323-339.

Efeoğlu, E. (2014). Çevreci açıdan girişim; eko-girişimcilik. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *23*(1), 103-118.

Egermeier, J., & Sashkin, M. (1992). *School change models and processes: A review and synthesis of research and practice*. Office of Educational Research and Improvement.

Ekici, G., & Gülay, H. (2010). MEB okul öncesi eğitim programının çevre eğitimi açısından analizi. *Journal of Turkish Science Education*. (1), 74-84.

Ekiz, D. (2009). *Bilimsel araştırma yöntemleri* (2. Baskı). Ankara: Anı Yayıncılık.

Ferreira, J., Ryan, L. & Tilbury, D. (2006) *Whole-School Approaches to Sustainability: A review of models for professional development in pre-service teacher education.* Australian Government Department of the Environment and Heritage and the Australian Research Institute in Education for Sustainability (ARIES).

Garipağaoğlu, N. (2020). Çevre sorunlarına Türk coğrafyacıların yaklaşımları ve bu alanda yapılmış olan çalışmalar. *Türkiye Araştırmaları Literatür Dergisi*, *18*(35), 5-45.

Gedik, Y. (2020). Sosyal, ekonomik ve çevresel boyutlarla sürdürülebilirlik ve sürdürülebilir kalkınma. *Uluslararası Ekonomi Siyaset İnsan ve Toplum Bilimleri Dergisi*, *3*(3), 196-215.

Gelişen, G., & Güzelkokar, O. (2019). Mevcut yapıların sürdürülebilir yeşil binalara dönüştürülmesi. *Ulusal Çevre Bilimleri Araştırma Dergisi*, *2*(2), 76-90.

Gencal, M., & Selçuk, G. N. (2023). Turizm endüstrisinde ekolojik ayak izi ve sürdürülebilir kalkınma ile ilişkisi. *Journal of Silk Road Tourism Research*, *3*(2), 1-15.

Glaudel, A., Pache, A., & Partoune, C. (2023). Environmental and sustainability education in compulsory education: Challenges and practices in Francophone Europe. *Environmental Education Research*, *29*(8), 1043-1055.

Gollan, P., Hill, M., & Wilkinson, A. (2001). The sustainability debate. *International Journal of Operations & Production Management*, *21*(12), 1492-1502.

Goodland, R. (1995). The concept of environmental sustainability. *Annual review of ecology and systematics*, *26*(1), 1-24.

Gül, E. D., & Kabacık, S. Ç. (2021). Okul öncesi eğitim ve permakültür. *OPUS International Journal of Society Researches*, *18*(Eğitim Bilimleri Özel Sayısı), 5140-5156.

Gülay, H. (2011). Ağaç yaş iken eğilir: Yaşamın ilk yıllarında çevre eğitiminin önemi. *TÜBAV Bilim Dergisi*, *4*(3).

Güler, T. (2010). Ekoloji temelli bir çevre eğitiminin öğretmenlerin çevre eğitimine karşı görüşlerine etkileri. *Eğitim ve Bilim*, *34*(151), 30-43.

Güler, T. (2010). Ekoloji temelli bir çevre eğitiminin öğretmenlerin çevre eğitimine karşı görüşlerine etkileri. *Eğitim ve Bilim*, *34*(151).

Günindi, Y. (2010). Okul öncesi öğretmenlerinin çevre dostu davranışlarının araştırılması. *TÜBAV Bilim Dergisi*, *3*(3).

Güven, E. (2023). Çevresel sürdürülebilirlik bağlamında yeşil dönüştürücü liderliğin eğitim örgütlerinde yansımaları: Literatür taraması. *Anadolu Eğitim Liderliği ve Öğretim Dergisi*, *11*(2), 446-462.

Harvey, G. D. (1976). *Environmental Education: A Delineation of Substantive Structure.* Southern İllinois University

Helgeson, S. L., & Roth, R. E. (1972). A Review of Research Related to Environmental Education. The Ohio State University.

Huckle, J., & Sterling, S. R. (Eds.). (1996). *Education for sustainability*. Earthscan.

Kabaday, A., & Veisson, M. (2018). Exploring the preschool teachers' views on professionalism, quality of education and sustainability: İnternational study in Estonia and Turkey. *Journal of Teacher Education for Sustainability*, *20*(2), 5-18.

Kaçmaz, G. (2021). İklim değişikliği ile mücadelede doğa temelli çözümler. *Peyzaj*, *3*(2), 82-92.

Kahyaoğlu, M. (2016). Türkiye'de çevre eğitimi üzerine yapılan araştırmalar: Bir içerik analizi çalışması. *Marmara Coğrafya Dergisi*, (34), 50-60.

Kalaba, B. (2021). Kültürel mirasın sürdürülebilirliği kapsamında müzelerin önemi. *Turizm Ekonomi ve İşletme Araştırmaları Dergisi*, *4*(1), 102-112.

Kara, M. (2023). Sürdürülebilirlik ve insan: Örnekler çerçevesinde bir değerlendirme. *Doğanın Sesi*, *6*(11), 4-14.

Karahan, S., Özbuğutu, E., & Tan, Ç. (2014). Çevre eğitimi ve alternatif yöntemler – Literatür taraması/Environmental education and its alternative methods – A literature review. *Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *11*(25), 393-408.

Kaya, L. G., & Orhan, İ. H. (2016). LEED belgeli yeşil binalar ve iç mekan kalitesinin incelenmesi. *Mehmet Akif Ersoy Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, *7*(Özel (Special) 1), 18-28.

Kayıhan, K. S., & Tönük, S. (2011). Sürdürülebilirlik bilincinin inşa edileceği binalar olma yönü ile temel eğitim okulları. *Politeknik Dergisi, 14*(2), 163-171.

Keleş, Ö. (2007). *Sürdürülebilir yaşama yönelik çevre eğitimi aracı olarak ekolojik ayak izinin uygulanması ve değerlendirilmesi.* [Doktora Tezi]. Gazi Üniversitesi.

Kiziroğlu, İ. (2023). Çevre eğitimi ve çevre bilinci. *Tabiat ve İnsan*, *2*(193), 5-17.

Kocalar, A. O. (2012). *Coğrafyada çevre eğitimi ve sorunları.* (Yayın No: 349945) [Doktora Tezi, Marmara Üniversitesi] Yök Tez Merkezi.

Koyuncu, M., & Nageye, F. (2020). İklim değişikliğinin sürdürülebilir hayvancılığa etkileri. *Hayvansal Üretim*, *61*(2), 157-167.

Leijten, P., Spitzer, J., Thomaes, S., & van de Wetering, J. (2022). Does environmental education benefit environmental outcomes in children and adolescents? A meta-analysis. *Journal of Environmental Psychology*, *81*, 101782

Malagila, J. K., Ntim, C. G., & Orazalin, N. S. (2024). Board sustainability committees, climate change initiatives, carbon performance, and market value. *British Journal of Management*, *35*(1), 295-320.

MEB, (2022). *Çevre Eğitimi ve İklim Değişikliği dersi öğretim programı.* Milli Eğitim Bakanlığı Talim ve Terbiye Kurulu Başkanlığı. https://mufredat.meb.gov.tr/ProgramDetay.aspx?PID=1143

Menteşe, S. (2017). Çevresel sürdürülebilirlik açısından toprak, su ve hava kirliliği: Teorik bir inceleme. *Journal of International Social Research*, *10*(53).

Metzger, E., & Parry, S. (2023). Barriers to learning for sustainability: A teacher perspective. *Sustainable Earth Reviews*, *6*(1), 2.

Ministry of Development (2012). *Turkey's sustainable development plan. Claiming the future.* Ankara: Ministry of Development

Morgil, F. İ., & Yücel, A. S. (1999). Çevre eğitiminin geliştirilmesi. *Balıkesir Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, *1*(1), 76-89.

Noy, C. (2008). Sampling knowledge: The hermeneutics of snowball sampling in qualitative research. *International Journal of Social Research Methodology, 11*(4), 327-344. doi:10.1080/13645570701401305

Orion, N., & Vasconcelos, C. (2021). Earth science education as a key component of education for sustainability. *Sustainability*, *13*(3), 1316.

Özdemir, O. (2010). Doğa deneyimine dayalı çevre eğitiminin ilköğretim öğrencilerinin çevrelerine yönelik algı ve davranışlarına etkisi. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, 27*(27), 125-138.

Özdemir, O. (2022). İnsanın Doğaya Bakışında Yol Ayırımı ve Doğa Yazını Destekli Sürdürülebilirlik Eğitimi. *Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Dergisi*, (54), 1425-1434.

Öztemel, E. (2018). Eğitimde yeni yönelimlerin değerlendirilmesi ve eğitim 4.0. *Üniversite Araştırmaları Dergisi*, *1*(1), 25-30.

Öztürk, M. (2017). Sürdürülebilir gelişme odaklı eğitim: Kuramsal çerçeve, tarihsel gelişim ve uygulamaya dönük öneriler. *İlköğretim Online*, *16*(4), 1-11.

Patton, M. Q. (2002). *Qualitative research & evaluation methods.* USA: SAGE Publications.

Rickinson, M. (2001). Learners and learning in environmental education: A critical review of the evidence. *Environmental education research*, *7*(3), 207-320.

Robertson, A. (1994). Toward constructivist research in environmental education. *The Journal of Environmental Education*, *25*(2), 21-31.

Sağlam, N., & Uzun, N. (2007). Orta öğretimde çevre eğitimi ve öğretmenlerin çevre eğitimi programları hakkındaki görüşleri. *Eurasian Journal of Educational Research*, *26*(26), 176-187.

Sağlam, N., & Uzun, N. (2007). Ortaöğretimde çevre eğitimi ve öğretmenlerin çevre eğitimi programları hakkındaki görüşleri. *Eurasian Journal of Educational Research*, *26*(26), 176-187.

Saldı, M., Selimoğlu, S.K. (2021). Covid-19 etkisinde sürdürülebilirliğin sağlanması ve iç denetimin değişen rotası. *Denetişim*, (22), 5-14.

Salīte, I. (2008). Educational action research for sustainability: Constructing a vision for the future in teacher education. *Journal of Teacher Education for Sustainability*, *10*(2008), 5-16.

Saloranta, S., & Uitto, A. (2017). Subject teachers as educators for sustainability: A survey study. *Education Sciences*, *7*(1), 8.

Scoones, I. (2007) Sustainability, Development in Practice, *17(*4-5), 589-596

Sönmez, D. (2018). Üniversite öğrencileri için çevre etiğinin gerekliliği: Türkiye'de konuyla ilgili yapılan çalışmaların değerlendirilmesi. *Uluslararası Eğitim Bilim ve Teknoloji Dergisi*, *4*(1), 18-27.

Sungurtekin, Ş. (2001). "Uygulamalı çevre eğitimi projesi" kapsamında ana ve ilköğretim okullarında "müzik yoluyla çevre eğitimi. *Uludağ Üniversitesi Eğitim Fakültesi Dergisi*, *9*(1), 167-178.

Tavşan, F., & Yanılmaz, Z. (2019). Eğitim yapılarında sürdürülebilir yaklaşımlar. *Sanat ve Tasarım Dergisi*, (24), 359-383.

Tayanç, M., & Tösten, R. (2024). Kültür inşasında mekân olarak modernist okul tarzına yönelik bir eleştiri. *Elektronik Sosyal Bilimler Dergisi*, *23*(89), 407-418.

TBMM (1982). *Türkiye Cumhuriyeti Anayasası.* Türkiye Büyük Millet Meclisi https://www5.tbmm.gov.tr/anayasa.htm

Turhan, E. (2012). Eğitim ve sürdürülebilir kalkınma (ESD) kavramı ve Türkiye'de okulların eko okula değişim ve dönüşümlerinde okul yöneticilerinin rolü. *Education Sciences*, *7*(1), 99-108.

Uğurlar, A. (2017). Turizmde sürdürülebilirlik: Bir ölçülebilirlik aracı olarak göstergelerin önemi. *İdealkent*, *8*(21), 118-140.

UNESCO, (1978). Final report of the *intergovernmental conference of environmental education.* https://unesdoc.unesco.org/ark:/48223/pf0000032763

UNESCO, (2015). *Education 2030: Towards Inclusive and Equitable Quality Education and Lifelong Learning for All*: World Education Forum. https://unesdoc.unesco.org/ark:/48223/pf0000233247

United Nations. (1973). *Report of the United Nations conference on the human environment.* United Nations Publication. https://digitallibrary.un.org/record/523249?v=pdf

United Nations. (1993). *Report of the United Nations conference of environment and development.* United Nations Publications. https://digitallibrary.un.org/record/168679?v=pdf

Van Petegem, P., Vanhoof, J., & Verhelst, D. (2023). School effectiveness for education for sustainable development (ESD): What characterizes an ESD-effective school organization?. *Educational Management Administration & Leadership*, *51*(2), 502-525.

Varlı, M. (2023). Ortaokul binalarının mekânsal kalite ve konfor özelliklerinin örnekler üzerinden incelenmesi. *KAPU Trakya Mimarlık ve Tasarım Dergisi*, *3*(2), 148-170.

Verep, H., & Vural, G. (2022). İlköğretim öğrencilerinin çevre bilinci ve farkındalığı üzerine çalışmalar. *Journal of Anatolian Environmental and Animal Sciences*, *7*(3), 331-335.

Yeni, O. (2014). Sürdürülebilirlik ve sürdürülebilir kalkınma: Bir yazın taraması. *Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 16*(3), 181-208.

Yıldırım, A. & Şimşek, H. (2008). *Sosyal bilimlerde nitel araştırma yöntemleri* (6. Baskı). Ankara: Seçkin Yayıncılık.