



Environmental Dimension in Sustainable Development Education: A Thematic Analysis*

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Abstract – The aim of this study is to evaluate national and international studies on sustainable environmental education (SEE) between 2019 and 2023 using thematic analysis method. In this context, ERIC, EBSCO, ProQuest, Springer, Wiley Online Library, Science Direct, Sage, Taylor & Francis, Elsevier, Scopus, ULAKBIM and Council of Higher Education National Thesis Center databases were examined. The study included 44 theses and 94 articles. The studies were analyzed by considering parameters such as year of publication, type of study, purpose, discipline, method, design, sampling, participants, data collection and analysis methods, conclusions and recommendations. It was observed that the majority of the studies were published in 2023 and were of article type. The studies generally aim to examine the effects of educational intervention on attitudes, motivation, behavior and achievement and are concentrated in the field of science. It was determined that purposeful sampling and undergraduate students were mostly studied, qualitative method and case study were preferred. A questionnaire was used for data collection, and t-test, content analysis, and thematic analysis were used for data analysis. The results include findings on the views, awareness and experiences of the participants. In the recommendations, it is emphasized that the content of the course, curriculum and teaching program should be improved and enriched.

Keywords: Sustainable environment, sustainable environmental education, sustainable development, thematic analysis.

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Introduction

The awareness of the dependence of people living in rural environments on these resources, which they acquired through direct contact with nature and natural resources, has decreased with the beginning of urbanization (Stapp, 1969). With the decrease in this awareness, as everyone knows, the world's vital natural resources have started to deplete (Dhull & Verma, 2017). In the 20th century, with the development of technology and industry, the increase in the need for production and consumption and the exponential increase in the human population led to environmental problems that caused great damage to nature (Alexandar & Poyyamoli, 2014; Gülersoy et al., 2021; Naz et al., 2020). As a result of human beings' desire to dominate over nature and other living species (Çakırlar Altuntaş & Turan, 2025; Mercan, 2023) and the reshaping of the human-environment relationship in line with people's expectations from the environment (Demir & Ulukaya Öteleş, 2023), environmental problems that threaten the life of the whole planet have emerged as a result of seeing natural resources as an endless consumption area. However, it is inevitable for human beings, regardless of where they live in rural or urban areas, to remember that their future and welfare are related to the proper use and management of these resources (Stapp, 1969). Climate change, water-air-environment pollution, deforestation, sea level rise, extinction of wildlife, unplanned urbanization and destruction of ecosystems are among the major global environmental problems that countries face (Griggs et al., 2013; Khoshnevis Yazdi et al., 2017; Sachs, 2012). It is evident that these environmental problems continue to grow, posing a serious threat to both our own species and other biological and physical components of our planet (Moni, 2009). We must pay attention to environmental degradation and threats and ensure that we restore and maintain the quality of the natural environment and resources that are the basis of all life (SauvÃ, 1996).

After people started to suffer from the negative effects they created, they began to look for various solutions in the national and international arena in order to protect the environment by eliminating or reducing the problems they caused (Kaya et al., 2010). Going back 200 years, the first environmental initiatives emerged with the need to protect endangered species, and in 1970, with the increasing signs of the deterioration of the planet (global warming, water, air and soil pollution, ozone depletion, etc.), the reasons for protecting nature diversified (Boca & Saraçlı, 2019). Through these reasons, environmental concerns have increased (Yeni, 2014) and the concept of “sustainable development” has emerged with environmental problems being counted among the undesirable effects of

economic growth (Brundtland, 1987). Although there are many definitions for the concept of sustainable development (Jóhannesson et al., 2011), which gained prominence in the 1970s and can be considered relatively new in both political and everyday language, the essence of these definitions is the same (Down & Down, 2018). However, Wall (2018) noted in his study that some researchers find it contradictory to use the terms “sustainable” and “development” together, and uncertainties about what can be sustained and to what extent are discussed. At the same time, Wall (2018) emphasized that the flexibility provided by this uncertainty is an advantage and can encourage the participation of people with different knowledge and perspectives in sustainable development. According to Ahmed (2019), the concept of sustainable development has become a dynamic issue with different meanings and interests depending on the context and region in which it is used, both developed and emerging. In its most common definition, as stated in the Brundtland Report, the concept of sustainable development aims to leave a clean and livable world to future generations without depriving them of these resources by using natural resources properly and effectively while meeting the needs of today's people (Henderson & Loreau, 2023; Shutaleva et al., 2020). The emphasis here is on adopting a rational management approach to solve the dilemmas arising from the interactions between humans and the world, so that the environment and its resources can be sustained without diminishing in an unlimited future (Disinger, 1990).

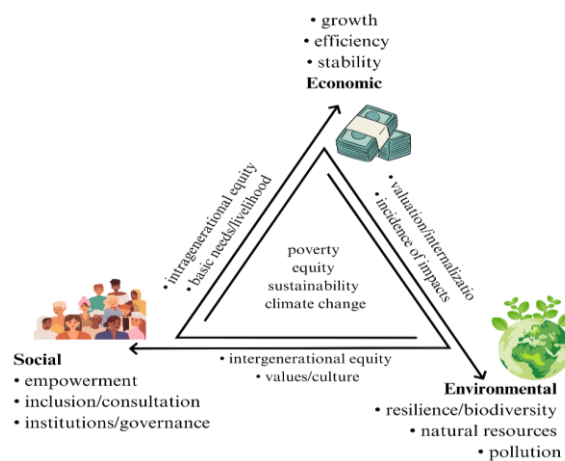


Figure 1 The Sustainable Development Triangle (Adapted from Munasinghe, 2009, p. 34)

The concept of sustainable development is not only an economic term (Büyükuslu, 2021). The concept consists of three components: economy, environment, and society (Berchin et al., 2021; Jabareen, 2008; Kopnina, 2020; Shao et al., 2011). Among the components, the economic dimension focuses on the correct and effective use of natural resources; the social dimension focuses on ensuring income equality and the continuity of the

cultural system; and the environmental dimension focuses on the balance of ecosystems (Akman et al., 2013). At this point, one of the important issues that distinguishes sustainability from other environmental protection movements is that sustainability takes a more holistic approach (Portney, 2015). Recognizing the importance of economic, environmental and social problems, sustainable development seeks solutions to all these problems (Schmandt & Ward, 2000). The United Nations [UN] is committed to bringing countries together to solve existing global problems and create a better future (Henderson & Loreau, 2023). At the United Nations Sustainable Development Summit held in New York on September 25-27, 2015, 17 key goals were set under the name of “Sustainable Development Goals” to achieve sustainable economic, social and environmental transformation worldwide by 2030 (Akbulut & Çölgeçen, 2023; Avcu & Bal, 2024; Russell-Bennett et al., 2024; Schreiber & Torabian, 2023; UN, 2015). Considering the potential of any destruction of nature to threaten all life on the planet, it can be said that the environmental dimension of the concept of sustainable development, which consists of three components, is more important than other components (Yıldız et al., 2021). If environmental sustainability is ensured, it will be easier to ensure economic and social sustainability because all economic activities are a product of society and it is the environment that provides social life (Engin, 2010). While achieving environmental sustainability is vital for the management of natural resources and the protection of the ecosystem, understanding its potential benefits before designing policies for this process will be a critical step in guiding global economies towards sustainable paths (Lei et al., 2023).

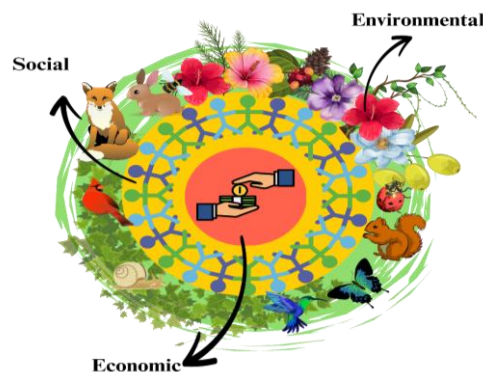


Figure 2 Definition of Sustainability According to Hart (1999) (Adapted from Oz Mehmet, 2008)

Sustainable Environment/Development Training for Sustainable Development Goals

Pavlova (2013) stated that the concepts of sustainable development education and environmental education differ across regions and countries and that these concepts are considered in three types of relationships: (i) environmental education is equal to sustainable

development education, (ii) environmental education is part of sustainable development education, (iii) environmental education and sustainable development education are different (but both are necessary). Throughout our literature review, we came across studies indicating that sustainable development education is examined in the context of environmental education (Debrah et al., 2021; Kasimov et al., 2005), that the two concepts are parallel to each other (McKeown & Hopkins, 2005), and that sustainable development education is more comprehensive than environmental education (Combes, 2005; Ferguson et al., 2021), and these concept differences were observed. Due to the perspectives in the international literature, it was felt necessary to put the words “environment” and “development” side by side in this title.

With the concept of sustainable development frequently discussed since the 80s, the idea of sustainable environmental education (SEE) has gained importance, and the goal has been to raise generations equipped with the necessary knowledge, skills, attitudes, and values (Tanriverdi, 2009). Lim et al. (2022) emphasize that education is the key to achieving sustainable development goals, while Engin (2010) highlights the central role of education in eliminating environmental problems and ensuring environmental sustainability. Lee et al. (2023) state that strengthening environmental education is a critical prerequisite for raising individuals who can develop solutions to global environmental disasters and for achieving sustainable development goals. In order to ensure sustainability and resolve environmental issues, it is necessary to educate individuals who understand the value of the environment and consider future generations when using resources (Özdemir & Yılmaz, 2023). Education encourages individuals to move toward a sustainable future by changing their perspectives (Tare, 2020) while also enabling them to gain more active and critical thinking skills (Kopnina, 2020). This process helps individuals shape their attitudes and behaviors toward improving and protecting the environment (Fien, 2001) while enabling them to gain a sense of personal responsibility and acquire various knowledge and skills to put this awareness into practice (Tilbury, 1997).

Uddin (2024) argues that environmental education focuses on increasing students' knowledge and skills to understand environmental problems and to produce effective solutions to these problems, while Dhull and Verma (2017) point out that environmental education will pave the way for a healthier and livable environment by increasing individuals' sensitivity to environmental problems. Potter (2009), on the other hand, considers educating policymakers with the awareness of ensuring environmental sustainability as a higher priority

than citizen education on this issue. Whether researchers use the concept of environmental education or sustainable development education in the context of environmental problems, the common point of the studies shows that sustainable development goals can only be realized through effective education.

If we refer to some studies related to sustainable environmental education, Wilujeng et al. (2019) examined the effect of environmental sustainability education (EESD) on developing students' environmental literacy in their quasi-experimental study conducted in Indonesia. In a science class themed “water power,” education supported by EESD-focused student worksheets created higher environmental awareness, responsibility, and environmental action intentions in students compared to the control group. The study's findings reveal that systems thinking, strategic planning, collaboration, and action-oriented approaches play an important role in strengthening students' environmental awareness. In this regard, the research emphasizes the critical importance of education in achieving sustainable development goals and concretely demonstrates the impact of practices that increase environmental literacy.

Hermawan et al. (2022) conducted a study in the Bali region of Indonesia to assess the environmental literacy levels of high school students and examine the impact of environment-based education programs. In a cross-sectional study involving 154 students, it was determined that their knowledge and cognitive skill levels were high, but their attitude and behavior levels remained only at an intermediate level. Although a significant relationship was found between knowledge and skills, no direct connection was identified between knowledge and attitude. The study argues that cognitive development does not automatically translate into environmental attitudes and behaviors, and that sustainable environmental education must be integrated into the cultural context.

Dunlop et al. (2022) have created a manifesto to identify the priorities of teachers and young people in order to make environmental sustainability education more effective. The study highlights the need for change at the classroom, school, community, and policy levels through workshops conducted in the United Kingdom. Participants suggest that education should not be limited to science and geography classes, that the curriculum should be redesigned accordingly, and that teachers should be supported in the process. The study reveals how the education system can better respond to sustainability.

When the relevant literature was examined, many studies on sustainable development/environmental education were found in domestic and foreign sources (Araneo,

2024; Baena-Morales et al., 2024; Bagoly-Simó, 2023; Boeve-de Pauw et al., 2022; Brandt et al., 2022; Calderon & Tan, 2023; Cheng, 2024; Dere & Çinikaya, 2023; Erten et al., 2022; Gavin & Audrin, 2023; Goodale et al., 2025; Gunansyah et al., 2021; Hademenos, 2024; Liu et al., 2022; Liu et al., 2024; Narong, 2024; Rodríguez-Loinaz et al., 2024; Rowe et al., 2015; Sergunin & Gutenev, 2023; Vysotska et al., 2021; Wang, 2017). In addition, various review studies on sustainable development education were also found in the literature (Doğru et al., 2019; Hallinger & Chatpinyakoo, 2019; Lim et al., 2022; Özerdinç et al., 2022; Toran, 2017; Yıldırım, 2020). However, it has been noticed that the review studies focus on a single genre, a single country or a single discipline area. On the other hand, no study was found in the literature that examined only the environmental dimension of sustainable development education. In our comprehensive thematic research, we aimed to contribute to the literature by revealing the current status and trends of research on the environmental dimension of sustainable development education.

The aim of our research is to examine the studies in the national and international literature on SEE between 2019 and 2023 using thematic analysis method. We tried to evaluate the publications included in the study by considering the parameters of publication year, publication type, purpose, discipline in which the study was applied, study method/design, sampling method, sample/participants, data collection method, data analysis method, results of the study, and recommendations. In this direction, answers to the following sub-questions were sought:

1. How is the distribution of research on SEE according to the year and type of publication?
2. How is the distribution of SEE studies according to their objectives?
3. How is the distribution of research on SEE according to the discipline in which it is applied?
4. How is the distribution of research on SEE according to study method and design?
5. How is the distribution of research on SEE according to sampling method?
6. How is the distribution of SEE studies according to their sample/participants?
7. How is the distribution of SEE studies according to data collection method?
8. How is the distribution of SEE studies according to data analysis method?
9. How is the distribution of SEE studies according to their results?
10. How is the distribution of research on SEE according to recommendations?

Method

Research Model

This study aims to examine studies conducted on SEE between 2019 and 2023 that hold an important place in national and international literature. For this reason, descriptive model was preferred in this study. Descriptive researches aim to describe the current situation as it is (Bykztrk et al., 2012).

Source of Data

The studies examined within the scope of the research were accessed from ERIC, EBSCO, ProQuest Dissertations and Theses Global, Springer, Wiley Online Library, Science Direct, Sage, Taylor & Francis, Elsevier and Scopus (A&I), ULAKBIM databases and YK National Thesis Center using the keywords “sustainable”, “sustainable environment”, “sustainable environmental education”. The keywords to be used in the study were determined in advance by the authors after reviewing the relevant literature, and it was decided to search multiple databases in order to obtain the maximum amount of data. During the data collection process, the databases mentioned above were searched twice between January and February 2024 by the first author and the studies that met the research criteria were downloaded and stored electronically. Then, both authors read the abstracts of these studies and, if necessary, the entire study to determine the final studies to be included in the research. As a result, a total of 138 studies were identified in the national and international literature between 2019 and 2023, including 44 theses and 94 articles, according to the inclusion and exclusion criteria listed below (Appendix 1). The selection process for the studies included in the research is detailed in Figure 3.

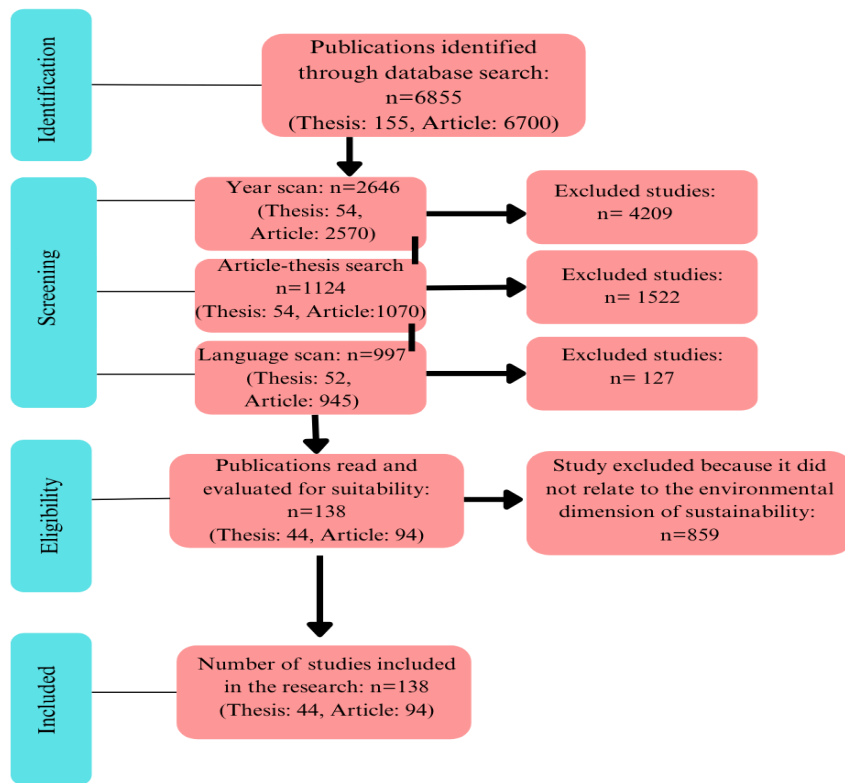


Figure 3 Illustration of the Data Collection Process Using the PRISMA Flow Chart

Inclusion Criteria

- The fact that the study was conducted within the scope of the environmental dimension of sustainable development education
- The study must have been conducted between 2019-2023
- Studies published in Turkish or English
- The studies should be in the form of articles or thesis

Exclusion Criteria

- Studies conducted outside the scope of education,
- Environmental education activities not related to sustainability,
- Papers and book studies were excluded from the scope of the research.

Data Collection and Analysis

The document analysis method was used to collect the data. Document analysis is defined by Bowen (2009) as the process of systematic examination and evaluation of printed or electronic materials. In order to explain the collected data, the thematic analysis method

was used to reveal the necessary concepts and relationships. Clarke and Braun (2017) defined thematic analysis as the process of generating themes and codes from qualitative data and stated that themes provide a framework for organizing research data and codes are the building blocks of these themes. While Aronson (1995) states that thematic analysis focuses on describable themes or patterns of behavior, Boyatzis (1998) defines it as a way of seeing and considers it as a process that can be used with almost all qualitative methods. As a result of the literature review, 138 studies included in the research were examined using the thematic analysis. The data collection and analysis process was carried out jointly by both authors to ensure the most accurate evaluation of the data. A deductive analysis approach was adopted in the study, and accordingly, several parameters aligned with the research purpose were determined before starting the analysis process. These parameters provided a framework regarding which themes we were looking for and what kind of structure we expected during the analysis. The parameters also served as references for the themes related to the sub-questions of the research. Classification criteria commonly used in previous thematic analysis studies were examined through a review of the literature. The coding form developed according to these criteria included publication year, publication type (thesis/article), purpose, discipline of the study, research method (qualitative/quantitative/mixed), research design, sampling method, sample/participants, data collection and analysis method, findings and recommendations. The coding form was reviewed by an expert who had previously conducted review-type studies. Since the expert found the criteria appropriate, no changes were made and the form was finalized. In this way, a consistent structure was established for the analysis process. This method was preferred in order to carry out the data analysis process systematically and to obtain comparable results.

During the data analysis process, each study included in the research was systematically numbered and independently analyzed by the researchers according to the predetermined themes. The data obtained were coded and recorded in a Microsoft Excel table. Once both authors completed their independent analyses, the Excel table were compared to identify similarities and differences. Subsequently, the differing codes were evaluated together by the authors and a common decision was taken. At this point, it was tried to ensure consistency between the intercoder. For reliability analysis, the formula suggested by Miles and Huberman (1994, p. 64) was used ($\text{reliability} = \frac{\text{number of agreements}}{\text{total number of agreements} + \text{disagreements}}$) and the reliability of the themes related to each research question was found to be above 80%. As a result of these analyzes, a total of 123 different

codes were developed in line with the previously defined themes. These codes were then grouped according to the themes. Finally, the alignment between the themes and codes and the research questions was reviewed, followed by the tabulation and interpretation of the findings.

Trustworthiness

In this study, the entire research process was presented openly and transparently to ensure trustworthiness. The literature review was conducted in many different databases in different time periods according to predetermined inclusion and exclusion criteria, with the aim of incorporating studies that might have been initially overlooked or added later (Batdi, 2019).

For the thematic analysis framework used in the study, the studies included in the research were coded independently by the researchers. Codes on which consensus was combined under themes. The study did not include any inference or perception-based codes, and all findings were generated directly from the data. At this point, in line with the principle of confirmability stated by Lincoln and Guba (1985), it was aimed that the results of our study would be free from the subjectivity of the researchers. In addition, the bibliographies of the studies included in the study are indicated in the references section. Thus, the confirmability of the research findings was ensured.

Findings

In this section, we present the findings of the studies on SEE in terms of publication year, publication type, purpose, discipline of the study, study method/design, sampling method, sample/participants, data collection method, data analysis method, results of the study and recommendations.

Table 1 Distribution of Studies on SEE According to Publication Year and Type

Year/Type	2019	2020	2021	2022	2023	f
Article	12	11	18	19	34	94
Master's thesis	9	4	4	3	11	31
Doctoral dissertation	4	2	1	1	5	13
Total	25	17	23	23	50	138

When Table 1 is examined, it can be seen that the distribution of studies related to SEE, especially articles, has generally increased over the years, except for 2020 (f=17), and that there has been a significant increase in 2023 (n=50). The increase in the number of studies

conducted over the years can be attributed to the fact that sustainability is becoming an increasingly important issue. While the number of studies has been increasing over the years, the decline in the number of studies in 2020 is thought to be due to the COVID-19 pandemic.

Table 2 Distribution of SEE Related Studies According to Their Purpose

Theme	Code	f
Purpose	To examine the effect of the intervention/education on knowledge, attitude, motivation, behavior and achievement	75
	Conducting due diligence on SEE	40
	To examine the impact of SEE on sustainability skills and literacy levels	8
	To reveal the awareness, opinions and experiences of the participants	67
	Develop new training strategies and techniques	5
	Total	195

Note: The reason why the total frequency value is higher than the number of studies analyzed is that some studies include more than one purpose.

Table 2 shows the distribution of studies on SEE according to their aims. In the studies examined, it was aimed to examine the effect of the intervention/education on attitude, motivation, behavior and success (f=75). Based on this finding, it can be said that studies related to SEE generally focus on the outcomes of the educational intervention applied. Subsequently, the most common objectives were to reveal the knowledge, awareness, opinions, and experiences of participants related to SEE (f=67) and to make a situation assessment related to SEE (f=40). Examining the impact of SEE on sustainability skills and literacy levels (f=8) and developing new educational strategies and techniques (f=5) were among the least preferred objectives. These findings indicate that studies in the field of SEE generally aim to reveal the existing situation and are application-oriented.

Table 3 Distribution of Studies on SEE According to the Discipline of Application

Theme	Code	f
Discipline	Economy	2
	Architecture	2
	Engineering	2
	Pre-school	7
	Science	19
	Mathematics	4
	Classroom education	6
	Social studies	11
	Turkish	3
	English	2
	Special education	1
	Physical education and sport	4
	Computer and instructional technologies	1
	Guidance and psychological counseling	2
	Public administration	1
	Accounting	1
	Business	1
	Chemistry	1
	Climate change	1
	Environmental science	4
Environmental sustainability	1	
Life science	1	
Unspecified	89	
	Total	166

Note: The reason why the total frequency value is higher than the number of studies analyzed is that some studies were conducted within the scope of more than one discipline.

Table 3 shows the frequency distribution of the discipline in which the studies on SEE were conducted. When the relevant table is analyzed, it is seen that most of the studies on SEE were conducted in science (f=19). This finding may be due to the fact that sustainability and environmental issues are most often associated with science in teaching programs. The fact that studies in disciplines such as social studies (f=11), preschool (f=7), and classroom education (f=6) are more numerous than in other disciplines may be seen as evidence that the call for the importance of early childhood education in sustainability and the environment has been echoed in academic publications. Although only one or a few studies were conducted in other disciplines, the small number of studies is evidence that SEE can be linked to many different disciplines. Another important finding is that the disciplines in which the 89 studies (approximately 64%) were conducted were not specified, indicating that studies in the field of SEE were not reported in detail, which limited the determination of trends in SEE studies according to the disciplines in which they were applied. This situation was considered a limitation of the study.

Table 4 Distribution of Studies on SEE According to Methods and Designs

Theme	Code	f
Qualitative	Case study	24
	Phenomenology pattern	10
	Document review	6
	Action research	5
	Descriptive design	3
	Narrative pattern	1
	Multispecies ethnography	1
	Grounded theory	1
	Unspecified	11
	Total	62
Quantitative	Descriptive survey design	19
	Relational survey design	10
	Quasi-experimental design	11
	Experimental design	6
	Weak experimental design	3
	Cross-sectional survey design	3
	Unspecified	9
	Total	61
Mixed	Exploratory sequential pattern	2
	Simultaneous triangulation	1
	Unspecified	12
	Total	15

Table 4 shows the distribution of studies on SEE according to their methods and designs. When the relevant table is examined, it is determined that qualitative (f=62) and quantitative (f=61) methods are preferred the most among the research methods, and mixed methods (f=15) are used the least. Considering the multifaceted nature of SEE and its applicability to many disciplines, it is quite striking that there are so few studies using mixed methods.

When the table is analyzed in terms of designs, it is seen that case study (f=24) was used the most among qualitative research designs, followed by phenomenology design (f=10), document analysis (f=6), action research (f=5) and descriptive design (f=3), respectively. Narrative design (f=1), multispecies ethnography (f=1) and grounded theory designs (f=1) are among the least used qualitative research designs. The design of 11 qualitative studies was not specified. Among the quantitative research designs, descriptive survey design (f=19) was used the most, followed by quasi-experimental design (f=11), relational survey design (f=10) and experimental design (f=6), and the least preferred quantitative designs were weak experimental design (f=3) and cross-sectional survey design (f=3). The design of 9 quantitative studies was not specified. Among the mixed research designs, exploratory sequential design (f=2) and simultaneous triangulation design (f=1) were used in the same number, and the design of 12 mixed studies was not specified. The existence of studies without specified research designs indicates a lack of reporting in the field of SEE.

Table 5 Distribution of Studies on SEE According to Sampling Method

Theme	Code	f
Sampling method	Purposive sampling	48
	Snowball sampling	3
	Appropriate sampling	27
	Maximum variation sampling	1
	Simple random sampling	23
	Criterion sampling	2
	Cluster sampling	2
	Layered sampling	1
	Homogeneous sampling	1
	Quota sampling	1
	Unspecified	29
	Total	138

Table 5 shows the distribution of studies on SEE according to sampling method. When the relevant table is examined, it is seen that the most preferred sampling method is purposive sampling (f=48). This finding may be evidence that researchers paid attention to specific criteria when selecting participants and sought to obtain more meaningful results in this regard. Following purposive sampling, appropriate sampling (f=27) and simple random sampling (f=23) are among the most preferred sampling methods. This preference may stem from researchers' aim to achieve more generalizable results. Snowball sampling (f=3), cluster sampling (f=2), maximum diversity sampling (f=1), stratified sampling (f=1), homogeneous sampling (f=1), and quota sampling (f=1) were found to be the least preferred sampling methods. In a total of 29 studies, no information was provided regarding the sampling method. This finding indicates that reliability and validity dimensions are also neglected in studies conducted in the field, in addition to reporting.

Table 6 Distribution of Studies on SEE According to Sample/Participants

Theme	Code	f
Sample/participants	Preschool students	9
	Primary school students	6
	Secondary school students	18
	High school students	11
	Undergraduate students	56
	Graduate students	6
	PhD students	2
	Teachers	29
	School principals	3
	Academicians	4
	Early childhood and care specialist team	1
	Canteen manager	1
	Unspecified	14
	Total	160

Note: The reason why the total frequency distribution is higher than the number of studies analyzed is that more than one sample/participant was preferred in some studies.

Table 6 shows the frequency distribution of the sample of the studies on SEE. When examining the relevant table, it is noteworthy that the most studied sample group was undergraduate students ($f=56$), and the reason for this finding may be that undergraduate students are more accessible to academics. Subsequently, it was observed that the most studied groups were teachers ($f=29$), middle school students ($f=18$), and high school students ($f=11$), respectively. The number of studies conducted with kindergarten students ($f=9$), elementary school students ($f=6$), and graduate students ($f=6$) is higher than the number of studies conducted with academics ($f=4$), school principals ($f=3$), and doctoral students ($f=2$). The relatively small number of studies conducted with kindergarten and elementary school students indicates that the impact of SEE has not been sufficiently investigated in early age groups. The least preferred sample group consists of early childhood and care specialists ($n=1$) and cafeteria managers ($n=1$). In total, 14 studies did not provide information about the sample group.

Table 7 Distribution of Studies on SEE According to Data Collection Tools

Theme	Code	f
Data collection tools	Document (visual, written document)	36
	Interview	42
	Survey	50
	Scale	37
	Observation	17
	Personal information form	5
	Test	7
	Total	194

Note: The reason why the total frequency distribution is higher than the number of studies analyzed is that more than one data collection tool was used in some studies.

Table 7 shows the frequency distribution of the data collection tools of the studies on SEE. When examining the relevant table, it can be seen that the most preferred data collection tool is the survey ($f=50$). This finding may have been frequently preferred, especially in studies with a large number of participants, in order to collect data more quickly. Next, the fact that interviews ($f=42$) are most frequently used to collect data shows that researchers are trying to obtain more detailed data. Subsequently, scales ($f=37$) and documents ($f=36$) were frequently preferred for data collection. Among the less frequently used data collection tools, observation ($f=17$) was found to be more frequently used than tests ($f=7$) and personal information forms ($f=5$). The fact that data collection through observation was less frequently used than other methods may be due to the length of the observation process. On the other hand, the low preference for tests may indicate that research focuses more on participants' attitudes and behaviors than their cognitive levels, while the low use of personal information

forms may indicate that demographic information is not prominent in SEE studies. In some studies, the use of multiple data collection tools indicates that researchers are careful to ensure data diversity.

Table 8 Distribution of Studies on SEE According to Data Analysis Methods

Theme	Code	f
Data analysis	Content analysis	37
	Descriptive analysis	15
	T-test	41
	ANOVA	22
	Inductive analysis	2
	Deductive analysis	1
	Thematic analysis	30
	Scheffe test	1
	Shapiro-Wilk test	5
	ANCOVA	1
	Kolmogorov Smirnov test	8
	Mann Whitney-U test	13
	Kruskal-Wallis H test	10
	Spearman correlation analysis	3
	Wilcoxon signed-rank test	7
	Chi-Square test	2
	Confirmatory factor analysis	2
	Exploratory factor analysis	3
	MANOVA	2
	Pearson correlation analysis	6
	Regression analysis	5
	Narrative analysis	1
	Abductive analysis	1
Rubrik	1	
Levene's test	1	
Structural equation modeling	1	
Unspecified	7	
Total	228	

Note: The reason why the total frequency distribution is higher than the number of studies examined is that more than one data analysis method was used in some studies.

Table 8 shows the frequency distribution of the data analysis methods of the studies on SEE. When examining the relevant table, the frequent use of t-tests (f=41) and ANOVA (f=22) methods indicates that studies generally focus on measuring differences between different groups. Subsequently, it was determined that qualitative analysis methods such as content analysis (f=37) and thematic analysis (f=30) were the most frequently preferred. Following these, descriptive analysis (f=15), Mann Whitney-U test (f=13), and Kruskal-Wallis H test (f=10) were frequently used analysis methods. Analysis methods such as the Kolmogorov-Smirnov test (f=8), Wilcoxon signed-rank test (f=7), Pearson correlation analysis (f=6), Shapiro-Wilk test (f=5), and regression analysis (f=5) were preferred more than Spearman correlation analysis (f=3), exploratory factor analysis (f=3), chi-square test (f=2), confirmatory factor analysis (f=2), and MANOVA (f=2) analysis methods. Inductive

analysis (f=1), deductive analysis (f=1), Scheffe test (f=1), ANCOVA (f=1), narrative analysis (f=1), inductive analysis (f=1), abductive analysis (f=1), rubric (f=1), Levene's test (f=1), and structural equation modeling (f=1) analysis were the least preferred data analysis methods. Based on these findings, it can be said that alternative assessment approaches are used to a limited extent in SEE studies. A total of 7 studies did not provide information about the data analysis method. This finding is considered a significant shortcoming in terms of scientific transparency.

Table 9 Frequency Distribution of the Results of Studies on SEE

Theme	Code	f
Results	Results on the effectiveness of the training intervention	42
	Results for concept knowledge	9
	Results on participants' attitudes, knowledge, achievement, behavior and motivation	60
	Results on participant views, awareness and experiences	67
	Results for curriculum programs/courses	25
	Results for demographic (gender, socio-economic status) characteristics	24
	Results on physical/social facilities and constraints	8
	Total	235

Note: The reason why the total frequency distribution is higher than the number of studies analyzed is that more than one result was reached in some studies.

Table 9 shows the frequency distribution of the results of the studies on SEE. When the relevant table is examined, it is seen that the most common results in the studies are the results related to participant opinions, awareness and experience (f=67). This finding shows that SEE studies emphasize the importance of participants' experience and awareness development. Subsequently, the frequency of results related to participants' attitudes, knowledge, success, behavior, and motivation (f=60) shows that studies on SEE often draw conclusions related to personal development and transformation. It was also found that the results related to the effectiveness of the educational intervention (f=42) were more prevalent than those related to curriculum programs/courses (f=25) and demographic characteristics (f=24). This finding indicates a significant trend in evaluating the effectiveness of the implemented education, while also showing that teaching materials and socio-economic factors are less frequently examined. Finally, it was found that the least mentioned results in the studies were, in order, results related to conceptual knowledge (f=9) and results related to physical/social opportunities (f=8). Based on this finding, it can be said that more research is needed on the effects of theoretical knowledge, concepts, and environmental factors on the educational process.

Table 10 Distribution of Studies on SEE According to Their Recommendations

Theme	Code	f
Recommendations	Recommendations for future studies	42
	Recommendations for educational method/approach/strategy	57
	Recommendations for cooperation (institutions, organizations, families, media, etc.)	25
	Recommendations for adding a course on sustainable environmental education	7
	Recommendations for curriculum development/enriching the content	81
	Recommendations for educators/academics	24
	Without recommendation	4
	Total	240

Note: The reason why the total frequency distribution is higher than the number of studies analyzed is that some studies included more than one recommendation.

Table 10 shows the frequency distribution of the recommendations of the studies on SEE. When the relevant table is examined, it is found that the recommendations for curriculum development and content enrichment (f=81) are the most common recommendations. This finding can be considered strong evidence that SEE topics and outcomes are not sufficiently covered in the current curriculum and teaching programs, or that there are deficiencies in this regard. Subsequently, considerable space has been devoted to recommendations regarding educational methods/approaches/strategies (f=57), indicating that researchers believe that, in addition to the content of SEE, its implementation also needs to be improved. Recommendations for future studies (f=42) point to the need to address existing methodological shortcomings in SEE research and to explore new research areas. Recommendations regarding collaboration (f=25) and educators/academics (f=24) emphasize the need to examine SEE in conjunction with more diverse groups (students, families, institutions, media, teachers, school administrators, etc.) and for academics and teachers to take on more active roles and receive support. The least frequently mentioned recommendations were those related to adding a course on SEE (f=7). This finding indicates that the focus is on strengthening SEE within existing curricula and teaching programs rather than teaching it as a separate course. Finally, a total of four studies did not explicitly include any recommendations.

Discussion, Conclusion and Recommendations

A total of 138 studies, including 44 theses and 94 articles in the national and international literature on SEE between 2019 and 2023, were examined by thematic analysis method within the parameters of publication year, publication type, purpose, discipline in

which the study was applied, study method/design, sampling method, sample/participant, data collection method, data analysis method, results of the study and recommendations.

It was observed that the most studies were conducted in 2023, and although there was a decrease in the number of studies conducted in the decline in the number of studies in 2020 is thought to be due to the COVID-19 pandemic. By 2023, the number of studies had doubled compared to other years. This finding is an indication that sustainability and environmental issues are increasingly becoming a topic of discussion worldwide, which is reflected in academic studies. Furthermore, the results obtained are similar to the results of previous analyses in the field (Doğru et al., 2019; Hallinger & Chatpinyakoop, 2019; Özerdinç et al., 2022; Yıldırım, 2020). The increase in the number of studies between 2019 and 2023 is consistent with the finding in the bibliometric study conducted by Hallinger and Chatpinyakoop (2019) that studies conducted after 2013 constitute 64% of the literature on sustainable development education in higher education. In addition, the general increase in the number of studies may have been influenced by the emphasis placed on environmental education for sustainable development at the national and international levels after the UN Sustainable Development Summit held in 2015. Furthermore, considering the interdisciplinary nature of SEE, it is possible to say that it attracted the attention of researchers working in many different fields and influenced the increase in the number of publications. Finally, the belief that sustainability goals can only be achieved through effective education can be considered an important factor in the increase in the number of studies related to SEE.

When the studies were examined according to publication type, it was found that most of the studies were in the form of articles, master's theses, and doctoral dissertations, respectively. The fact that there were significantly more studies in the form of articles than theses indicates that studies in the field of SEE are generally short-term and produced in article format. The low number of thesis-type studies may serve as evidence of a lack of in-depth and long-term studies in the field of SEE. Although our finding regarding the type of publication is in line with the findings of some studies (Doğru et al., 2019; Hallinger & Chatpinyakoop, 2019), it is not in line with other studies (Özerdinç et al., 2022; Toran, 2017; Yıldırım, 2020). This discrepancy may be due to differences such as the year range covered by other researchers, focusing only on national studies, databases examined, etc.

When we examined the studies according to their aims, it was found that the aims to reveal the effect of the educational intervention on the attitude, motivation, behavior and

achievement of the participants were more than other aims. This trend is consistent with the general view that sustainability goals can only be achieved through effective education that raises awareness among individuals and brings about positive attitudes and behavioral change. Additionally, this objective has been observed in studies where students were selected as samples/participants (Kriewaldt & Lee, 2023; Maidou et al., 2019; Prabawani et al., 2020; Purwanto et al., 2020). As noted in the study by Brandt et al. (2019), considering the inevitable impact of teachers on achieving sustainability goals, the fact that this objective is not addressed in the context of working teachers highlights a gap in the literature.

Subsequently, it was found that among the most common objectives in the studies were those aimed at revealing participants' awareness, knowledge, and experiences. This finding is similar to the findings of other studies (Özerdinç et al., 2022; Toran, 2017). The prominence of these two objectives in the studies examined shows that research trends generally aim to create awareness, attitude, and behavior change in participants. Among the examined objectives, the scarcity of studies measuring skill and literacy levels (Hermawan et al., 2022; Mashaba et al., 2022; Wilujeng et al., 2019) points to another gap in the literature. In line with the importance of developing 21st-century skills such as problem-solving and critical thinking, in addition to creating attitudes, behaviors, and awareness in individuals in SEE (González-Salamanca et al., 2020), it is thought that studies on skill and literacy levels should increase.

When the studies were examined according to the discipline in which they were conducted, it was found that studies on SEE were mostly conducted in science, followed by social studies, preschool and classroom education (Afacan, 2020; Aslan Efe et al., 2020; Avan et al., 2023; Candaş & Çalik, 2023; Celikler et al., 2023; Cirit Gül et al., 2022; Demir & Aydınli, 2020; İbret et al., 2019). The reason for this trend in the field may stem from the fact that environmental and sustainability issues are particularly linked to the curricula of these disciplines, and from the view that early exposure to SEE has a more lasting impact on individuals. However, the consideration of SEE in other disciplines is negligible when considering the interdisciplinary approach to sustainability. For this reason, it is believed that studies integrating SEE with different disciplines will contribute significantly to the development of SEE and to researchers in this field, particularly by providing different perspectives.

When the related studies were analyzed in terms of the research method used, it was concluded that qualitative, then quantitative and least mixed research methods were preferred.

This situation shows that qualitative data-based approaches are often preferred in the field of SEE. However, considering the scope and interdisciplinary structure of SEE, more comprehensive results can be obtained with mixed-method studies in this field. Toran (2017), on the other hand, concluded that quantitative, followed by qualitative and least mixed methods were preferred in his study. The reasons mentioned above (as in the publication types parameter) may lead to the differentiation of the results. It is thought that a comprehensive view of the development of the field of SEE will be provided by increasing mixed method studies in the future.

When we examined the research designs used in the related studies, it was concluded that case study was the most preferred qualitative research design and descriptive survey design was the most preferred quantitative research design. This situation indicates that researchers are conducting studies that focus more on revealing the current situation. It has been observed that document review, relational scanning, and phenomenology designs are preferred over other designs. The findings of Özerdinç et al. (2022) support this result. Another important finding is that experimental designs are less preferred than other designs. Based on this finding, we can say that researchers focus more on identifying existing conditions than on developing SEE. The reason for this situation may be that researchers generally refrain from conducting experimental designs that require long-term applications due to the lack of sufficient coverage of sustainability and environmental issues in teaching programs. On the other hand, the lengthy process of obtaining the necessary permits from educational institutions and/or ethics committees for experimental applications, as well as the reluctance of school administrators to engage in experimental studies due to concerns that they may disrupt the flow of lessons, may also be another reason for the lack of preference for experimental designs. At this point, we can suggest that experimental studies should be increased for the development of SEE.

When the studies on SEE were analyzed according to the sampling method, we found that purposive sampling was the most preferred method, followed by convenience sampling and simple random sampling, respectively. Based on these findings, the use of purposive sampling may stem from researchers' desire to conduct more in-depth analyses with participants selected according to specific criteria. On the other hand, the frequent use of simple random and convenient sampling methods may indicate that researchers generally prefer to work with easily accessible groups. It was observed that methods such as cluster

sampling, stratified sampling and homogeneous sampling were less preferred compared to other methods.

When we examined the related studies according to their sample and participants, we found that the most preferred participant/sample group was undergraduate students and especially pre-service teachers. Although this finding does not coincide with Torans' (2017) study, it is in line with the findings of other studies (Özerdinç et al., 2022; Yıldırım, 2020). Considering the importance of higher education institutions and especially teacher training programs in terms of achieving sustainable development goals, the selection of undergraduate students as the most participants/samples gives hope for the future of SEE. However, it is also noteworthy that the number of studies including academicians, graduate students and doctoral students is quite low. Likewise, while there are many studies in which teachers constitute the sample/participant group, there are few studies in which school principals are included in the sample/participant group. Based on the fact that an effective education comes to life when all stakeholders fulfill their responsibilities (Gajda & Koliba, 2007), it is necessary to conduct comprehensive studies in which all stakeholders of education (teachers, students, school administrators and even parents) are included in the sample. Another conclusion we reached is that the number of studies in which kindergarten and primary school students are preferred as sample/participants is quite low. This finding may be attributed to the inability to fully comprehend abstract concepts in early childhood, the difficulty of ethical processes, and the limitations of measurement tools. However, Akkoy and Poyraz (2023) mention the importance of early childhood education in developing positive attitudes and behaviors toward the environment in their study, emphasizing the need for academics and educators to collaborate in order to conduct research aimed at fostering positive attitudes in individuals at an early age. Based on these findings, it can be said that future studies to be conducted with kindergarten and primary school students are extremely important for the effectiveness and development of SEE and thus for the realization of sustainable development goals.

When the studies on SEE were analyzed in terms of data collection tools, it was found that the most commonly used data collection tool was the questionnaire. Surveys were followed by semi-structured interviews and scales. It was determined that the preferred scales were generally aimed at measuring attitudes and behaviors towards sustainable environment. This finding shows that researchers aim to reveal more individual perceptions and tendencies. In a small number of studies, personal information forms were used to collect data. In addition, many researchers used a combination of data collection tools such as questionnaires,

observations, scales and interviews. In line with these findings, it is possible to say that the researchers reached their conclusions as a result of analyzing rich data. In parallel with our findings, Özerdinç et al. (2022) found that scale was the most preferred method, followed by document and interview methods, respectively.

When studies on SEE were examined according to data analysis methods, it was found that the most preferred methods were t-tests and content analysis. This finding shows that the studies examined both the differences between different groups and the participants' experiences. Subsequently, it was found that analysis methods such as thematic analysis, ANOVA, and descriptive analysis were frequently preferred. Although the findings of a similar study (Özerdinç et al., 2022) largely overlap with our findings, there are some differences. For example, according to our findings, the most preferred analysis method was t-test and content analysis respectively, while this finding was found to be the opposite in the related study.

When the studies on SEE are analyzed in terms of the results obtained, it is observed that attitudes towards SEE are positive, but this alone is not sufficient. At this point, it was concluded that there is a need for new educational teaching methods and a strengthened curriculum on SEE that will increase knowledge and create behavioral change. Another conclusion is that teachers and prospective teachers experience deficiencies in knowledge and awareness. In a qualitative study conducted with a total of 20 teachers from different disciplines such as mathematics, science, social studies and language arts teachers, it was seen that teachers had limited knowledge about zero waste and sustainable development, and it was suggested that all educational stakeholders (teachers, students, parents) should be trained on zero waste and this training should be given as a separate course (Altıntaş et al., 2024). Kalsoom and Qureshi (2021) succeeded in increasing the existing capacities of pre-service teachers by integrating sustainable development education into the “research methods in education” course within the scope of their research and suggested that sustainable development education should be taught as an independent course in teacher training programs. Based on these findings, it is possible to say that teacher training and in-service training programs should be strengthened with a focus on SEE. In addition, it was concluded that educational interventions such as drama, documentary, project-based and augmented reality-based etc. contributed to the participants' positive attitudes and behavioral changes. This situation demonstrates the effectiveness of experiential learning applied to participants. In this regard, future studies focusing on participant-centered and innovative learning

strategies could make significant contributions to the field. Although the positive effects of the intervention were generally observed in the studies, it was determined that some studies also included negative results. For example, in one study, activities based on active learning were applied to pre-service teachers, and it was observed that these activities contributed to the development of positive behaviors but did not change attitudes (Muşlu Kaygısız, 2020). This situation shows that imparting knowledge and skills does not always have an impact on the development of individual attitudes.

When the related studies were analyzed in terms of the recommendations they offered, it was concluded that the recommendation of developing and strengthening curriculum programs was the most repeated recommendation. This finding indicates that SEE is not adequately reflected in the current curriculum. If sustainability goals are to be realized, it is thought that this issue, which is emphasized by many researchers, should be resolved first. Another recommendation, which ranked second and was emphasized the most, was related to educational teaching methods and strategies. It is important for students not only to acquire knowledge but also to be able to use this knowledge to solve problems they encounter in their daily lives. For this reason, more lasting and meaningful learning can be achieved by using experiential learning strategies that encourage active student participation. Another very striking recommendation is the cooperation of various media, institutions and organizations. Tare (2020) stated that it is vitally important to work together, especially in education. Jamil and Appiah-Adjei (2025) stated that the role of the media in raising awareness and creating transformative behavioral change in large masses is important in ensuring environmental sustainability. Sachs (2012) stated that the development of technology and social media has enabled everyone who uses technology to work collaboratively and networked, from scientists to students, from civil society organizations to political leaders, wherever they are in the world. Therefore, ensuring the collaboration of various public institutions, non-governmental organizations, academics, political leaders, teachers, students and civil society, especially through the media, will increase the positive outcomes of SEE.

According to the results obtained, the following recommendations can be made for educators and researchers who will conduct future studies on SEE:

For teachers,

- ✓ Environmental education can be associated with science, social sciences and other branch courses and an interdisciplinary approach can be demonstrated.

- ✓ Projects can be carried out in cooperation with other teachers, parents and organizations.
- ✓ Student participation can be increased through project and technology-based learning methods.
- ✓ They can update their knowledge by participating in events and in-service training programs organized on SEE.

For researchers,

- ✓ Studies with experimental design can be included more to evaluate the effects of SEE.
- ✓ Research using a combination of qualitative and quantitative methods can be used to examine SEE more comprehensively.
- ✓ The effectiveness of SEE can be enhanced and evaluated more holistically through comprehensive studies that include educational stakeholders such as teachers, school principals, parents, and students in the sample.
- ✓ Educational interventions and materials can be developed to address knowledge gaps on issues such as zero waste and sustainable development.
- ✓ Develop theoretical and practical curricula for sustainable environmental education.

Compliance with Ethical Standards

Disclosure of potential conflicts of interest

There is no conflict of interest to declare.

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Research involving Human Participants and/or Animals

This article did not involve human participants and/or animals.

Sürdürülebilir Kalkınma Eğitiminde Çevresel Boyut: Tematik Bir Analiz

Özet:

Bu çalışmanın amacı, 2019-2023 yılları arasında sürdürülebilir çevre eğitimi üzerine yapılan ulusal ve uluslararası çalışmaları tematik analiz yöntemiyle değerlendirmektir. Bu kapsamda ERIC, EBSCO, ProQuest, Springer, Wiley Online Library, Science Direct, Sage, Taylor & Francis, Elsevier, Scopus, ULAKBİM ve Yükseköğretim Kurulu Ulusal Tez Merkezi veri tabanları incelenmiştir. Çalışmada 44 tez ve 94 makale ele alınmıştır. Çalışmalar, yayın yılı, çalışma türü, amaç, disiplin, yöntem, desen, örnekleme, katılımcı, veri toplama ve analiz yöntemleri ile sonuç ve öneriler gibi parametreler dikkate alınarak analiz edilmiştir. Çalışmaların çoğunluğunun 2023 yılında ve makale türünde olduğu görülmüştür. Çalışmalar genellikle eğitim müdahalesinin tutum, motivasyon, davranış ve başarı üzerindeki etkilerini incelemeyi amaçlamakta ve fen bilimleri alanında yoğunlaşmaktadır. En çok amaçlı örneklemenin kullanıldığı ve lisans öğrencileri üzerinde çalışıldığı, nitel yöntem ve durum çalışmasının tercih edildiği belirlenmiştir. Veri toplamada anket kullanılmış, veri analizinde t-testi, içerik analizi ve tematik analiz uygulanmıştır. Sonuçlar, katılımcıların görüşleri, farkındalıkları ve deneyimlerine dair bulgular içermektedir. Önerilerde ise ders, müfredat ve öğretim programının içeriğinin iyileştirilmesi ve zenginleştirilmesi gerektiği vurgulanmaktadır.

Anahtar kelimeler: Sürdürülebilir çevre, sürdürülebilir çevre eğitimi, sürdürülebilir kalkınma, tematik analiz.

References

- Afacan, Ö. (2020). Investigation of pre-service science teachers' behavior towards sustainable environmental education. *International Electronic Journal of Environmental Education*, 10(1), 110-121. <https://dergipark.org.tr/en/pub/iejeegreen/issue/49969/650738>
- Ahmed, B. (2019). Environmental governance and sustainable development in Bangladesh: Millennium development goals and sustainable development goals. *Asia Pacific Journal of Public Administration*, 41(4), 237-245. <https://doi.org/10.1080/23276665.2019.1698930>
- Akbulut, F., & Çölgeçen, B. (2023). The role of regional development plans in transforming The United Nations 2030 sustainable development goals into national public policies. *Journal of Political Science*, 11(1), 200-220. <https://doi.org/10.14782/marmarasbd.1162481>
- Akkoy, S., & Poyraz, M. (2023). The place of recycling concept in primary school curriculum within the scope of sustainable environmental education. *Ankara Üniversitesi Çevre Bilimleri Dergisi*, 10(2), 15-24. <https://dergipark.org.tr/pub/aucevrebilim/issue/81445/1351066>
- Akman, E., Negiz, N., & Akman, Ç. (2013). Sürdürülebilir bir kalkınma için yavaşça acele et (Festina Lente). In B. Özer, & G. Şeker (Eds.), *Yerel ve bölgesel kalkınma: Küresel ve yerel bakış açıları* (pp. 37-54). Celal Bayar Üniversitesi Matbaa Birimi.
- Alexandar, R., & Poyyamoli, G. (2014). The effectiveness of environmental education for sustainable development based on active teaching and learning at high school level-a case study from Puducherry and Cuddalore regions, India. *Journal of Sustainability Education*, 7(1), 1-20. <http://www.jsedimensions.org/wordpress/wp-content/uploads/2014/12/Alexandar-Poyyamoli-JSE-Vol-7-Dec2014.pdf>
- Altıntaş, S., Ozdinc, I., & Ceyhan, G. D. (2024). Teachers' knowledge and views on developing zero waste education within the sustainable development goals framework. *International Research in Geographical and Environmental Education*. <https://doi.org/10.1080/10382046.2024.2363653>
- Araneo, P. (2024). Exploring education for sustainable development (ESD) course content in higher education; A multiple case study including what students say they like.

Environmental Education Research, 30(4), 631–660.

<https://doi.org/10.1080/13504622.2023.2280438>

Aronson, J. (1995). A pragmatic view of thematic analysis. *The Qualitative Report*, 2(1).

<https://doi.org/10.46743/2160-3715/1995.2069>

Aslan Efe, H., Yücel, S., & Efe, R. (2020). The effect of making documentaries on science student teachers' attitudes towards the environment for sustainable development. *Van Yüzüncü Yıl University Journal of Education*, 17(1), 436-454.

<https://doi.org/10.33711/yyuefd.692958>

Avan, Ç., Şeker, F., & Aydın, B. (2023). Investigation of preschool teacher candidates' views on zero waste. *Journal of Human and Social Sciences*, 6(2), 486-506.

<https://doi.org/10.53048/johass.1377012>

Avcu, G., & Bal, C.G. (2024). Sustainability summit: Value-focused approach panel” document analysis in the framework of sustainable development goals and corporate sustainability. *Çevre, İklim ve Sürdürülebilirlik*, 25(1), 1–14.

<https://dergipark.org.tr/tr/pub/itucis/issue/84136/1227679>

Baena-Morales, S., Prieto-Ayuso, A., Merma-Molina, G., & González-Villora, S. (2024). Exploring physical education teachers' perceptions of sustainable development goals and education for sustainable development. *Sport, Education and Society*, 29(2), 162–179. <https://doi.org/10.1080/13573322.2022.2121275>

Bagoly-Simó, P. (2023). Geography's unkept promises of education for sustainable development (ESD) on geography's wasted potential to educate for a more sustainable future. *International Research in Geographical and Environmental Education*, 32(1), 53-68. <https://doi.org/10.1080/10382046.2023.2158631>

Batdı, V. (2019). Meta-tematik analiz. In V. Batdı (Ed.) *Meta-tematik analiz: Örnek uygulamalar* (pp. 9-50). Anı.

Berchin, I. I., de Aguiar Dutra, A. R., & de Andrade Guerra, J. B. S. O. (2021). How do higher education institutions promote sustainable development? A literature review. *Sustainable Development*, 29(6), 1204-1222. <https://doi.org/10.1002/sd.2219>

Boca, G.D., & Saraçlı, S. (2019). Environmental education and student's perception, for sustainability. *Sustainability*, 11(6). <https://doi.org/10.3390/su11061553>

- Boeve-de Pauw, J., Olsson, D., Berglund, T., & Gericke, N. (2022). Teachers' ESD self-efficacy and practices: A longitudinal study on the impact of teacher professional development. *Environmental Education Research*, 28(6), 867–885.
<https://doi.org/10.1080/13504622.2022.2042206>
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27-40. <https://doi.org/10.3316/QRJ0902027>
- Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. Sage.
- Brandt, J. O., Barth, M., Hale, A., & Merritt, E. (2022). Developing ESD-specific professional action competence for teachers: Knowledge, skills, and attitudes in implementing ESD at the school level. *Environmental Education Research*, 28(12), 1691-1729. <https://doi.org/10.1080/13504622.2022.2064973>
- Brandt, J. O., Bürgener, L., Barth, M., & Redman, A. (2019). Becoming a competent teacher in education for sustainable development: Learning outcomes and processes in teacher education. *International Journal of Sustainability in Higher Education*, 20(4), 630-653.
<https://doi.org/10.1108/IJSHE-10-2018-0183>
- Brundtland, G. H. (1987). Our common future—Call for action. *Environmental Conservation*, 14(4), 291-294. <https://doi.org/10.1017/S0376892900016805>
- Büyüköztürk, Ş., Çakmak, E. K., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2012). *Bilimsel araştırma yöntemleri* (13th ed.). Pegem Akademi.
- Büyükuslu, A.R. (2021). *Sürdürülebilirlik kalkınma ve endüstri 5.0*. Der.
- Calderon, P. E. E., & Tan, M. K. M. (2023). Care for the environment as a consideration in bioethics discourse and education. *The New Bioethics*, 29(4), 352–362.
<https://doi.org/10.1080/20502877.2023.2219021>
- Candaş, B., & Çalik, M. (2023). The effect of CKCM-oriented instruction on grade 8 students' conceptual understanding of sustainable development. *Journal of Biological Education*, 57(5), 986-1005. <https://doi.org/10.1080/00219266.2021.2006748>
- Celikler, D., Aksan, Z., & Yilmaz, A. (2023). Raising awareness in sustainable environment education: Waste batteries. *Pedagogical Research*, 8(2), em0157.
<https://doi.org/10.29333/pr/13002>

- Cheng, C. (2024). A critical analysis of Chinese early childhood education policy documents from the perspective of education for sustainable development. *Early Years*, 44(3-4), 860-873. <https://doi.org/10.1080/09575146.2023.2255935>
- Cirit Gül, A., Tağrikulu, P., Çobanoğlu, İ. H., & Çobanoğlu, E. O. (2022). Evaluation of prospective teachers' attitudes towards sustainable environmental education. *Inonu University Journal of the Faculty of Education*, 23(1), 645-670. <https://doi.org/10.17679/inuefd.1062923>
- Clarke, V., & Braun, V. (2017). Thematic analysis. *The Journal of Positive Psychology*, 12(3), 297–298. <https://doi.org/10.1080/17439760.2016.1262613>
- Combes, B. P. Y. (2005). The United Nations decade of education for sustainable development (2005–2014): Learning to live together sustainably. *Applied Environmental Education & Communication*, 4(3), 215-219. <https://doi.org/10.1080/15330150591004571>
- Çakırlar Altuntaş, E., & Turan, S. L. (2025). Effectiveness of documentary-based augmented reality application in teaching environmental problems. *Journal of Biological Education*, 59(1), 4-15. <https://doi.org/10.1080/00219266.2023.2282423>
- Debrah, J.K., Vidal, D.G., & Dinis, M.A.P. (2021). Raising awareness on solid waste management through formal education for sustainability: A developing countries evidence review. *Recycling*, 6(1), 6. <https://doi.org/10.3390/recycling6010006>
- Demir, E. S., & Aydın, B. (2020). Environmental education; A qualitative study on sustainable environment. *Social Scientific Centered Issues*, 2(1), 8-14. <https://dergipark.org.tr/en/pub/ssci/issue/55156/734187>
- Demir, F. B., & Ulukaya Öteleş, Ü. (2023). Environmental problems and solution suggestions for environmental problems from the perspective of teachers. *Bolu Abant İzzet Baysal University Journal of Faculty of Education*, 23(1), 379-396. <https://doi.org/10.17240/aibuefd.2023..-1224985>
- Dere, İ., & Çinikaya, C. (2023). Reflections of Tbilisi Declaration and UN 2030 sustainable development goals on environmental education and climate change curriculum. *ODU Journal of Social Sciences Research*, 13(1), 1343-1366. <https://doi.org/10.48146/odusobiad.1218188>

- Dhull, P., & Verma, G. (2017). Environmental education in teacher education and challenges. *International Journal of Academic Research and Development*, 2(5), 84–87. <https://allstudiesjournal.com/archives/2017/vol2/issue5/2-4-175>
- Disinger, J. F. (1990). Environmental education for sustainable development?. *The Journal of Environmental Education*, 21(4), 3-6. <https://doi.org/10.1080/00958964.1990.9941931>
- Doğru, M., Güzeller, C. O., & Çelik, M. (2019). A bibliometric analysis in the field of sustainable development and education from past to present. *Adiyaman University Journal of Educational Sciences*, 9(1), 42-68. <https://doi.org/10.17984/adyuebd.515009>
- Down, K. A., & Down, L. (2018). Implementers’ perspectives on creating successful education for sustainable development projects. *Caribbean Quarterly*, 64(1), 167–187. <https://doi.org/10.1080/00086495.2018.1435348>
- Dunlop, L., Rushton, E. A. C., Atkinson, L., Ayre, J., Bullivant, A., Essex, J., Price, L., Smith, A., Summer, M., Stubbs, J. E., Turkenburg-van Diepen, M., & Wood, L. (2022). Teacher and youth priorities for education for environmental sustainability: A co-created manifesto. *British Educational Research Journal*, 48(5), 952-973. <https://doi.org/10.1002/berj.3803>
- Engin, H. (2010). *Teaching sustainable development, education of sustainability and environmental education in geography education* (Publication No. 264124) [Master’s thesis, Marmara University], Council of Higher Education Thesis Center.
- Erten, S., Köseoğlu, P., & Gök, B. (2022). Environmental education in science teaching programs: the case of Turkey, Canada, America. *Mehmet Akif Ersoy University Journal of Education Faculty*, (63), 220-246. <https://doi.org/10.21764/maeuefd.1019038>
- Ferguson, T., Roofe, C., & Cook, L. D. (2021). Teachers’ perspectives on sustainable development: the implications for education for sustainable development. *Environmental Education Research*, 27(9), 1343–1359. <https://doi.org/10.1080/13504622.2021.1921113>
- Fien, J. (2001). The learning for a sustainable environment project: A case study of an action network for teacher education. *Australian Journal of Environmental Education*, 17, 77-86. <https://doi.org/10.1017/S0814062600002470>

- Gajda, R., & Koliba, C. (2007). Evaluating the imperative of intraorganizational collaboration: A school improvement perspective. *American Journal of Evaluation*, 28(1), 26-44. <https://doi.org/10.1177/1098214006296198>
- Gavin, A. S., & Audrin, C. (2023). ESD in school: Understanding French-speaking Swiss pupils' representations of sustainability. *Environmental Education Research*, 29(8), 1144–1154. <https://doi.org/10.1080/13504622.2022.2128061>
- González-Salamanca, J. C., Agudelo, O. L., & Salinas, J. (2020). Key competences, education for sustainable development and strategies for the development of 21st century skills. A systematic literature review. *Sustainability*, 12(24), 10366. <https://doi.org/10.3390/su122410366>
- Goodale, A. Y., Gilmore, M. P., & Griffiths, B. M. (2025). 21st-century stewardship: infusing environmental stewardship education with global citizenship. *Environmental Education Research*, 31(2), 364–389. <https://doi.org/10.1080/13504622.2024.2335614>
- Griggs, D., Stafford-Smith, M., Gaffney, O., Rockström, J., Öhman, MC, Shyamsundar, P., Steffen, W., Glaser, G., Kanie, N., & Noble, I. (2013). Sustainable development goals for people and planet. *Nature*, 495, 305–307. <https://doi.org/10.1038/495305a>
- Gunansyah, G., Zuhdi, U., & Rohadatul'Aisy, M. (2021). Sustainable development education practices in elementary schools. *Journal of Education and Learning*, 15(2), 178-187. <https://doi.org/10.11591/edulearn.v15i2.17091>
- Gülersoy, A. E., Yener, H., Turgut, T., Özşahin, D. M., & Açıkgöz, D. A. (2021). Some suggestions for an ideal environmental education policy in age of chaos. *Turkish Studies*, 16(5), 1495-1552. <https://doi.org/10.7827/turkishstudies.52102>
- Hademenos, G. (2024). Globalizing STEM instruction using sustainable development goals. *The Science Teacher*, 91(4), 66–74. <https://doi.org/10.1080/00368555.2024.2358182>
- Hallinger, P., & Chatpinyakoo, C. (2019). A bibliometric review of research on higher education for sustainable development, 1998–2018. *Sustainability*, 11(8), 2401. <https://doi.org/10.3390/su11082401>
- Henderson, K., & Loreau, M. (2023). A model of sustainable development goals: Challenges and opportunities in promoting human well-being and environmental sustainability. *Ecological Modelling*, 475, 110164. <https://doi.org/10.1016/j.ecolmodel.2022.110164>

- Hermawan, I. M. S., Suwono, H., Paraniti, A. A. I., & Wimuttipanya, J. (2022). Student's environmental literacy: An educational program reflections for sustainable environment. *Jurnal Pendidikan Biologi Indonesia*, 8(1), 1-9. <https://doi.org/10.22219/jpbi.v8i1.16889>
- İbret, B. Ü., Demirbaş, İ., & Demir, F. B. (2019). Primary school 4th grade students to gain responsibility for natural environment with alternative activities. *Cumhuriyet International Journal of Education*, 8(1), 258-280. <https://doi.org/10.30703/cije.474570>
- Jabareen, Y. A. (2008). A new conceptual framework for sustainable development. *Environment, Development and Sustainability*, 10, 179–192. <https://doi.org/10.1007/s10668-006-9058-z>
- Jamil, S., & Appiah-Adjei, G. (2025). The dire need of ecological sustainability in Pakistan: The agenda setting role of news media to address environmental problems. *Media Asia*. <https://doi.org/10.1080/01296612.2024.2396214>
- Jóhannesson, I. Á., Norðdahl, K., Óskarsdóttir, G., Pálsdóttir, A., & Pétursdóttir, B. (2011). Curriculum analysis and education for sustainable development in Iceland. *Environmental Education Research*, 17(3), 375-391. <https://doi.org/10.1080/13504622.2010.545872>
- Kalsoom, Q., & Qureshi, N. (2021). Impact of sustainability-focused learning intervention on teachers' agency to teach for sustainable development. *International Journal of Sustainable Development & World Ecology*, 28(6), 540-552. <https://doi.org/10.1080/13504509.2021.1880983>
- Kasimov, N. S., Malkhazova, S. M., & Romanova, E. P. (2005). Environmental education for sustainable development in Russia. *Journal of Geography in Higher Education*, 29(1), 49-59. <https://doi.org/10.1080/03098260500030363>
- Kaya, N., Çobanoğlu, M., & Artvinli, E. (2010, November 3-5). Sürdürülebilir kalkınma için Türkiye'de ve dünyada çevre eğitimi çalışmaları. *Proceedings of the VI. National Geography Symposium* (pp. 407-417), Türkiye. https://tucaum.ankara.edu.tr/wp-content/uploads/sites/280/2015/08/semp6_44.pdf
- Khoshnevis Yazdi, S., Shakouri, B., Salehi, H., & Fashandi, A. (2017). Sustainable development and ecological economics. *Energy Sources, Part B: Economics, Planning, and Policy*, 12(8), 740–748. <https://doi.org/10.1080/15567249.2017.1296506>

- Kopnina, H. (2020). Education for the future? Critical evaluation of education for sustainable development goals. *The Journal of Environmental Education*, 51(4), 280-291. <https://doi.org/10.1080/00958964.2019.1710444>
- Kriewaldt, J., & Lee, S. J. (2023). Towards powerful knowledge: An Australian case study of prospective teachers' knowledge and dispositions for sustainability education. *International Research in Geographical and Environmental Education*, 32(1), 35-52. <https://doi.org/10.1080/10382046.2022.2146836>
- Lee, M., Yang, J. E., Kim, H., Moon, J., Ryu, H. S., & Lee, J. Y. (2023). Effective environmental education for sustainable development beyond the plastic age in South Korea. *Environmental Education Research*, 29(9), 1328–1345. <https://doi.org/10.1080/13504622.2023.2190530>
- Lei, L., Ozturk, I., Murshed, M., Abrorov, S., Alvarado, R., & Mahmood, H. (2023). Environmental innovations, energy innovations, governance, and environmental sustainability: Evidence from South and Southeast Asian countries. *Resources Policy*, 82. <https://doi.org/10.1016/j.resourpol.2023.103556>
- Lim, C. K., Haufiku, M. S., Tan, K. L., Farid Ahmed, M., & Ng, T. F. (2022). Systematic review of education sustainable development in higher education institutions. *Sustainability*, 14(20), 13241. <https://doi.org/10.3390/su142013241>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage.
- Liu, G., Huan, X., & Deng, X. (2024). Research on environment and sustainable development education under the background of green ecology. *AQUA—Water Infrastructure, Ecosystems and Society*, 73(4), 790-803. <https://doi.org/10.2166/aqua.2024.325>
- Liu, X., Chen, Y., Yang, Y., Liu, B., Ma, C., Craig, G. R., & Gao, F. (2022). Understanding vocational accounting students' attitudes towards sustainable development. *Journal of Vocational Education & Training*, 74(2), 249-269. <https://doi.org/10.1080/13636820.2020.1760333>
- Maidou, A., Plakitsi, K., & Polatoglou, H. (2019). Knowledge, perceptions and attitudes on education for sustainable development of pre-service early childhood teachers in Greece. *World Journal of Education*, 9(5), 1-15. <https://doi.org/10.5430/wje.v9n5p1>
- Mashaba, E. K., Maile, S., & Manaka, M. J. (2022). Learners' knowledge of environmental education in selected primary schools of the Tshwane North District, Gauteng Province.

- International Journal of Environmental Research and Public Health*, 19(23), 15552.
<https://doi.org/10.3390/ijerph192315552>
- McKeown, R., & Hopkins, C. (2005). EE and ESD: Two paradigms, one crucial goal. *Applied Environmental Education & Communication*, 4(3), 221-224.
<https://doi.org/10.1080/15330150591004616>
- Mercan, G. (2023). The pioneering role of foundation for environmental education in Turkey: An examination of education and awareness-raising efforts for a sustainable future. *International Journal of Eurasia Social Sciences (IJOESS)*, 14(53), 1212-1238.
<https://doi.org/10.35826/ijoess.3358>
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis* (2nd ed.). Sage.
- Moni, M. H. (2009). Why Japan's development aid matters most for dealing with global environmental problems. *Asia-Pacific Review*, 16(1), 8-36.
<https://doi.org/10.1080/13439000902957590>
- Munasinghe, M. (2009). *Sustainable development in practice: Sustainomics methodology and applications*. Cambridge University.
- Muşlu Kaygısız, G. (2020). The effect of active learning based activities on the sustainable environmental attitudes, positive behaviors and environmental attitudes of primary school teacher candidates. *The Journal of Turkish Educational Sciences*, 18(1), 185-200. <https://doi.org/10.37217/tebd.679596>
- Narong, D. K. (2024). A system-based framework for engineering education as sustainable development. *European Journal of Engineering Education*, 49(5), 911-927.
<https://doi.org/10.1080/03043797.2024.2374481>
- Naz, F., Oláh, J., Vasile, D., & Magda, R. (2020). Green purchase behavior of university students in Hungary: An empirical study. *Sustainability*, 12(23), 10077.
<https://doi.org/10.3390/su122310077>
- Ozmehmet, E. (2008). Dünyada ve Türkiye sürdürülebilir kalkınma yaklaşımları. *Journal of Yaşar University*, 3(12), 1853-1876.
<https://dergipark.org.tr/tr/pub/jyasar/issue/19124/202943>
- Özdemir, G., & Yılmaz, S. (2023). Opinions of secondary school students and teachers on the transdisciplinary environmental education program. *Baskent University Journal of Education*, 10(2), 177-192. <https://dergipark.org.tr/en/pub/bujoe/issue/78999/1247292>

- Özerdinç, F., Kızılay, E., & Hamalosmanoğlu, M. (2022). Analysis of studies on sustainable development in education: a meta-synthesis study. *Aksaray Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 6(1), 33-51. <https://doi.org/10.38122/ased.976188>
- Pavlova, M. (2013). Towards using transformative education as a benchmark for clarifying differences and similarities between environmental education and education for sustainable development. *Environmental Education Research*, 19(5), 656–672. <https://doi.org/10.1080/13504622.2012.736476>
- Portney, K. E. (2015). *Sustainability*. MIT.
- Potter, G. (2009). Environmental education for the 21st century: Where do we go now?. *The Journal of Environmental Education*, 41(1), 22–33. <https://doi.org/10.1080/00958960903209975>
- Prabawani, B., Hadi, S. P., Zen, I. S., Afrizal, T., & Purbawati, D. (2020). Education for sustainable development as diffusion of innovation of secondary school students. *Journal of Teacher Education for Sustainability*, 22(1), 84-97. <https://doi.org/10.2478/jtes-2020-0007>
- Purwanto, A., Ichsan, I. Z., Gomes, P. W. P., & Rahman, M. M. (2020). ESBOR during COVID-19: Analysis students attitude for develop 21st century environmental learning. *Journal of Sustainability Science and Management*, 15(7), 20-29. <https://eric.ed.gov/?id=ED610162>
- Rodríguez-Loinaz, G., Ametzaga-Arregi, I., & Palacios-Agundez, I. (2024). ICT tools and citizen science: a pathway to promote science learning and education for sustainable development in schools. *Journal of Biological Education*, 58(3), 609–625. <https://doi.org/10.1080/00219266.2022.2092192>
- Rowe, D., Gentile, S. J., & Clevey, L. (2015). The U.S. partnership for education for sustainable development: progress and challenges ahead. *Applied Environmental Education & Communication*, 14(2), 112–120. <https://doi.org/10.1080/1533015X.2014.978048>
- Russell-Bennett, R., Rosenbaum, M. S., Fisk, R. P., & Raciti, M. M. (2024). SDG editorial: Improving life on planet earth—a call to action for service research to achieve the sustainable development goals (SDGs). *Journal of Services Marketing*, 38(2), 145-152. <https://doi.org/10.1108/JSM-11-2023-0425>

- Sachs, J. D. (2012). From millennium development goals to sustainable development goals. *The Lancet*, 379(9832), 2206-2211. [https://doi.org/10.1016/s0140-6736\(12\)60685-0](https://doi.org/10.1016/s0140-6736(12)60685-0)
- SauvÃ, L. (1996). Environmental education and sustainable development: A further appraisal. *Canadian Journal of Environmental Education*, 1(1), 7-34. <https://cjee.lakeheadu.ca/article/view/490>
- Schmandt, J., & Ward, C. H. (2000). Challenge and response. In J. Schmandt, C.H. Ward, & M. Hastings (Eds.), *Sustainable development: The challenge of transition* (pp. 1-9). Cambridge University.
- Schreiber, B., & Torabian, J. (2023). Student development in higher education in the era of the agenda 2030 and the UN's sustainable development goals: Towards SDGs 2.0. *Journal of College and Character*, 24(1), 61–68. <https://doi.org/10.1080/2194587X.2022.2157442>
- Sergunin, A., & Gutenev, M. (2023). Teaching the Arctic's sustainable development at Russian universities. *Polar Geography*, 46(1), 18–40. <https://doi.org/10.1080/1088937X.2023.2210177>
- Shao, G., Li, F., & Tang, L. (2011). Multidisciplinary perspectives on sustainable development. *International Journal of Sustainable Development & World Ecology*, 18(3), 187-189. <https://doi.org/10.1080/13504509.2011.572304>
- Shutaleva, A., Nikonova, Z., Savchenko, I., & Martyushev, N., (2020). Environmental education for sustainable development in Russia. *Sustainability*, 12(18), 7742. <https://doi.org/10.3390/su12187742>
- Stapp, W. B. (1969). The concept of environmental education. *Environmental Education*, 1(1), 30-31. <https://doi.org/10.1080/00139254.1969.10801479>
- Tanrıverdi, B. (2009). Analyzing Primary School Curriculum in Terms of Sustainable Environmental Education. *Education and Science*, 34(151), 89-103. <https://educationandscience.ted.org.tr/article/view/796>
- Tare, M. (2020). Education for sustainable development. *Technology & Innovation*, 21(4), 1-3. <http://doi.org/10.21300/21.4.2020.2>
- Tilbury, D. (1997). *Environmental education: A head, heart and hand approach to learning about environmental problems* (ED417600). ERIC. <https://eric.ed.gov/?q=HO+AND+HO&pg=146&id=ED417600>

- Toran, M. (2017). Sustainable development for early childhood education: A review of publications in Turkey. *Journal of Early Childhood Studies*, 1(1), 33-44.
<https://journalofomepturkey.org/index.php/eccd/issue/view/3>
- Uddin, Md. K. (2024). Environmental education for sustainable development in Bangladesh and its challenges. *Sustainable Development*, 32(1), 1137–1151.
<https://doi.org/10.1002/sd.2728>
- United Nations (2015). *Transforming our world: The 2030 agenda for sustainable development*. Department of Economic and Social Affairs Sustainable Development.
<https://sdgs.un.org/2030agenda>
- Vysotska, O., Rieznikov, S., Rohova, E., Vysotskyi, O., & Vatkovska, M. (2021). Philosophy and Practice of education for sustainable development in Ukraine: On the example of secondary education in the dniproptetrovsk region. *European Journal of Sustainable Development*, 10(2), 256-256. <https://doi.org/10.14207/ejsd.2021.v10n2p256>
- Wall, G. (2018). Beyond sustainable development. *Tourism Recreation Research*, 43(3), 390-399. <https://doi.org/10.1080/02508281.2018.1475880>
- Wang, C. L. (2017). No-Self, natural sustainability and education for sustainable development. *Educational Philosophy and Theory*, 49(5), 550-561.
<https://doi.org/10.1080/00131857.2016.1217189>
- Wilujeng, I., Dwandaru, W. S. B., & Rauf, R. B. A. (2019). The effectiveness of education for environmental sustainable development to enhance environmental literacy in science education: A case study of hydropower. *Jurnal Pendidikan IPA Indonesia*, 8(4), 521-528. <https://doi.org/10.15294/jpii.v8i4.19948>
- Yeni, O. (2014). Sustainability and sustainable development: A survey of the literature. *Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 16(3), 181-208.
<https://dergipark.org.tr/pub/gaziuibfd/issue/28309/300838>
- Yıldırım, G. (2020). Thematic review of educational research on sustainability. *Mediterranean Journal of Educational Research*, 14(33), 70-106.
<https://doi.org/10.29329/mjer.2020.272.4>
- Yıldız, K., Güzel Gürbüz, P., Esentaş, M., Beşikçi, T., & Balıkçı, İ. (2021). Analysis of the relation between sustainable environmental education of university students and their

attitude towards environmental problems *International Journal of Social Science Research*, 10(1), 35-49. <https://dergipark.org.tr/tr/pub/ijssresearch/issue/63420/939469>

Appendix 1. Included Studies Lists

No	Author(s) / Year	Title
1	Afacan, Ö. (2020)	Investigation of pre-service science teachers' behavior towards sustainable environmental education
2	Agirreazkuenaga, L., & Martinez, P. M. (2021)	Secondary students' perception, positioning and insight on education for sustainability
3	Akkaya Alıcı, Y. (2022).	Okul öncesi çocuklar için e-kitap ile bütünleştirilmiş sürdürülebilirlik eğitimi
4	Aktaş, F. (2019)	İlköğretim programlarının sürdürülebilir kalkınma hedefleri açısından, çevre eğitimi ve iklim değişikliği boyutunda incelenmesi
5	Al-Faleh, H. (2022)	Students' awareness of sustainable environmental development and its impact on their intention to implement the eco-school program in their schools in Jordan
6	Ameli, K. (2022)	Where is nature? Where is nature in nature and outdoor learning in higher education? An analysis of nature-based learning in higher education using multispecies ethnography
7	Aslan Efe, H., Yücel, S., & Efe, R. (2020)	Belgesel çekme etkinliğinin fen bilgisi öğretmen adaylarının sürdürülebilir kalkınma için çevreye yönelik tutumları üzerindeki etkisi
8	Avan, Ç., Şeker, F., & Aydın, B. (2023)	Investigation of preschool teacher candidates' views on zero waste
9	Avinç, E., & Timur, S. (2023)	Inter-students: Students' opinions and ethical perceptions on environment and sustainability
10	Aydın, E. (2021)	Ortaokul öğrencilerinin ve fen bilimleri öğretmenlerinin sürdürülebilir çevre tutumları ile öğrencilerin çevre konularına ilişkin öğrenme düzeylerinin belirlenmesi
11	Bakar, F., Avan, Ç., Aydın, B., Şeker, F., & Turgut, B. (2021)	Effects of nature education on environmental knowledge and attitude as an out of school learning environment
12	Balakrishnan, B., Tochinai, F., Kanemitsu, H., & Al-Talbe, A. (2021)	Education for sustainable development in Japan and Malaysia: A comparative study among engineering undergraduates
13	Barrable, A. (2019)	Refocusing environmental education in the early years: A brief introduction to a pedagogy for connection
14	Belen, B. (2020)	Ortaöğretim öğrencilerinin sürdürülebilir çevre hakkındaki bilgi, tutum ve davranışlarının belirlenmesi
15	Bladow, J. (2023)	Integrating environmental education into teacher preparation programs
16	Bolat, N. (2023)	Sınıf öğretmenlerinin çevre eğitimi öz yeterlilikleri ile sürdürülebilir çevreye yönelik tutumları arasındaki ilişkinin incelenmesi
17	Candaş, B., & Çalik, M. (2023).	The effect of CKCM-oriented instruction on grade 8 students' conceptual understanding of sustainable development
18	Caner, Ö. (2019)	Öğretmen adaylarının okul dışı öğrenme ortamlarında sürdürülebilir çevre eğitimine yönelik tutumları
19	Castro, H. L., Goicochea, C. U., & Colán, J. E. (2022)	Perception of environmental problems among higher education students in Peru
20	Celikler, D., Aksan, Z., & Yilmaz, A. (2023)	Raising awareness in sustainable environment education: Waste batteries
21	Chan, Y. W. (2023)	Taiwanese junior high social studies teachers' definitions of sustainability

22	Charkova, D. A., & Somova, E. (2023)	The role of sustainable development in the academic curriculum and prospective employment: A survey of information technology students in Bulgaria
23	Chien, C. Y. (2019)	English for ecotourism and its sustainability with augmented reality technology
24	Cirit Gül, A., Tağrikulu, P., Çobanoğlu, İ. H., & Çobanoğlu, E. O. (2022)	Öğretmen adaylarının sürdürülebilir çevre eğitime yönelik tutumlarının değerlendirilmesi
25	Commins, D. (2020)	Do inquiry-based lessons on climate change affect students' attitudes towards the environment?
26	Çakır, B. (2023)	Sürdürülebilir çevre eğitim programının 60-72 aylık çocukların çevreye yönelik tutum ve farkındalık düzeyine etkisi
27	Çavuşoğlu, Ü. (2019)	Öğretmen adaylarının çevre eğitimi öz-yeterlilikleri ile sürdürülebilir çevreye yönelik tutumları arasındaki ilişkinin incelenmesi
28	Çimen, H. (2019)	Fen bilgisi ve sınıf öğretmeni adaylarının sürdürülebilir çevreye yönelik tutumlarının incelenmesi
29	Daşdemir, Ç. (2021)	Ortaöğretim öğrencilerinin çevresel olaylara karşı duyarlılıklarının belirlenmesi
30	Datey, A. (2023)	Decolonising the design curriculum: Making "sustainability" accessible, understandable and practicable to second-year undergraduate architecture students
31	Demir, E. S., & Aydın, B. (2020)	Environmental education; A qualitative study on sustainable environment
32	Demirtaş, F., & Çinici, A. (2019)	Sekizinci sınıf öğrencilerinin ekolojik ayak izleri ile sürdürülebilir çevre tutumlarının çeşitli değişkenler açısından incelenmesi
33	Dere, İ., & Çinikaya, C. (2023)	Tiflis bildirgesi ve BM 2030 sürdürülebilir kalkınma amaçlarının çevre eğitimi ve iklim değişikliği dersi öğretim programına yansımaları
34	Dunlop, L., Rushton, E. A. C., Atkinson, L., Ayre, J., Bullivant, A., Essex, J., Price, L., Smith, A., Summer, M., Stubbs, J. E., Turkenburg-van Diepen, M., & Wood, L. (2022)	Teacher and youth priorities for education for environmental sustainability: A co-created manifesto
35	Dündar, R., & Kızılk, M. M. (2022).	Ekolojik okuryazarlık, çevre eğitimi ve sürdürülebilir gelişme odaklı eğitim anlayışı bağlamında çevre temasının hayat bilgisi dersi programındaki yerinin incelenmesi
36	Efe, H. (2023)	Coğrafya'da sürdürülebilir çevre eğitimi: Bilgi, tutum ve öz yeterlik açısından incelenmesi
37	El-Kholei, A. O., & Yassein, G. A. (2023)	Embedding sustainability and SDGs in architectural and planning education: Reflections from a KAP survey, Egypt
38	Fernández, D. C., Gómez-Gonçalves, A., & Sánchez-Barbero, B. (2023)	Effectiveness of interdisciplinary instruction in pre-service teacher education for sustainability: Issues from the big history and the study of climate change
39	Floresca, J. A. (2019)	Nature walk program as means of reconnecting with the natural environment: An alternative physical education
40	Freeman, C. (2023)	Sustainability in K-12 education: How can schools support students to address challenges of environmental sustainability?
41	Fruend, J. R. (2019)	Evolving an ecological way of thinking: Social interactions and the construction of environmentally sustainable behaviors in adolescents during expeditionary learning

42	Furu, A. C., & Valkonen, S. (2021)	Gearing up for sustainability education in Finnish early childhood education and care (ECEC): Exploring practices and pedagogies by means of collegial reflection and discussion
43	Gertz, L. N. (2023)	Environmental education for sustainability
44	Ghosn-Chelala, M., & Akar, B. (2021)	Citizenship education for environmental sustainability in Lebanon: Public school teachers' understandings and approaches
45	Glackin, M., & Greer, K. (2021)	Environmental education-related policy enactment in Japanese high schools
46	Groening, Z. (2022).	The effect of an intervention on experienced chemistry teachers' pedagogical content knowledge of environmental sustainability
47	Gülçiçek, T. (2021).	The relationship between pre-service early childhood teachers' environmental education self-efficacy beliefs and their attitudes towards sustainable environment
48	Güleç, S. (2022).	5E öğrenme modeli uygulamalarının ortaokul öğrencilerinin akademik başarılarına, ekolojik ayak izi farkındalıklarına ve sürdürülebilir çevreye yönelik tutumlarına etkisi
49	Gülersoy, A. E., Yener, H., Turgut, T., Özşahin, D. M., & Açıkgöz, D. A. (2021).	Kaos çağında ideal bir çevre eğitimi politikası için bazı öneriler
50	Halliwell, P., Whipple, S., Hassel, K. N., Bowser, G., Husic, D. W., & Brown, M. A. (2020).	Twenty-first-century climate education: Developing diverse, confident, and competent leaders in environmental sustainability.
51	Hermawan, I. M. S., Suwono, H., Paraniti, A. A. I., & Wimuttipanya, J. (2022).	Student's environmental literacy: An educational program reflections for sustainable environment
52	Hicks, A. (2023)	Using counterintuitive sustainability examples in teaching life cycle assessment: A case study
53	Holfelder, A. K. (2022)	Teaching sustainability: A study of teachers and conceptual tensions
54	Huseynova, Z. (2023)	Öğretmen adaylarının sürdürülebilir çevre eğitimine yönelik tutumlarının tespiti
55	İbret, B. Ü., Demirbaş, İ., & Demir, F. B. (2019).	İlkokul 4. sınıf öğrencilerine alternatif etkinliklerle doğal çevreye duyarlılığın kazandırılması
56	Jordan, K. E. (2023)	The intersection of environmental and sustainability education, and character education: An instrumental case study
57	Kadioğlu Ateş, H., & Işık Öner, A. (2020)	Öğretmen adaylarının çevre sorunlarına yönelik farkındalık düzeyinin incelenmesi
58	Kahriman Pamuk, D., & Ahi, B. (2023)	Preservice preschool teacher's phenomenological understanding of environment: A projection to education for sustainable development
59	Kalsoom, Q., & Qureshi, N. (2021).	Impact of sustainability-focused learning intervention on teachers' agency to teach for sustainable development
60	Karahan Aydın, B. (2019)	Okul öncesi öğretmenlerinin sürdürülebilir çevre eğitimine yönelik algıları
61	Kennedy, A. (2023)	Storying journeys in environmental & sustainability education: Navigating teacher candidates' ESE experiences
62	Keser, E. (2023)	Beden eğitimi ve spor yüksekokulu öğrencilerinin sürdürülebilir çevre tutum düzeyleri: Diyarbakır Dicle Üniversitesi örneği
63	Kılıç, M. (2020).	İlkokullarda görev yapan öğretmenlerin çevreye yönelik tutumlarının sosyodemografik özellikler açısından değerlendirilmesi: Düzce ili örneği

64	Kiraz, A., Ab Albakoush, I. A., & Köprülü, F. (2023).	Perceptions of lecturers on sustainable environmental education
65	Korkmaz, G. (2020)	Yenilenen öğretmen yetiştirme lisans programlarının sürdürülebilir kalkınma için eğitim bağlamında incelenmesi
66	Korkut Demir, C. (2023)	Görsel sanatlar öğretmenlerinin sürdürülebilirlik kavramını kazandırmaya yönelik görüşleri
67	Köseoğlu, P., & Erten, S. (2022)	Paris Anlaşması'na göre çevre eğitimi nasıl olmalıdır?
68	Kriewaldt, J., & Lee, S. J. (2023)	Towards powerful knowledge: An Australian case study of prospective teachers' knowledge and dispositions for sustainability education
69	Kulaç, O., & Tahtalıoğlu, H. (2021)	Sustainable development education in public administration graduate programs: The cases of Pamukkale and Nigde Omer Halisdemir Universities
70	Larsson, J., & Samuelsson, I. P. (2019)	Collective resources as a precursor for educating children toward a sustainable global world
71	Lestari, H., Ali, M., Sopandi, W., Wulan, A. R., & Rahmawati, I. (2022).	The impact of the RADEC learning model oriented ESD on students' sustainability consciousness in elementary school
72	Lorek, A., Lorek, E., & Koczur, W. (2023)	Education for sustainable development in polish institutions of higher education—present and future
73	Luan, H., Li, T. L., & Lee, M. H. (2022)	High school students' environmental education in Taiwan: Scientific epistemic views, decision-making style, and recycling intention
74	Maidou, A., Plakitsi, K., & Polatoglou, H. (2019)	Knowledge, perceptions and attitudes on education for sustainable development of pre-service early childhood teachers in Greece
75	Majjala, M., Heikkola, L. M., Kuusalu, S. R., Laine, P., Mutta, M., & Mäntylä, K. (2023)	Pre-service language teachers' perceptions of sustainability and its implementation in language teaching
76	Manni, A. (2023)	Education “through” sustainable development in Swedish school-age educate—exploring how SAEC is responding to ESD in daily practices
77	Marchal-Gaillard, V., Marzin-Janvier, P., Boilevin, J. M., & Grimault-Leprince, A. (2021)	Contribution of early childhood education to a sustainable society: Influences from home in preschool children's understanding of composting in France
78	Martínez-Mirambell, C., Boned-Gómez, S., Urrea-Solano, M., & Baena-Morales, S. (2023)	Step by step towards a greener future: The role of plogging in educating tomorrow's citizens
79	Mashaba, E. K., Maile, S., & Manaka, M. J. (2022)	Learners' knowledge of environmental education in selected primary schools of the Tshwane North District, Gauteng Province
80	Mathers, A., Fan, S., & Austin, Z. (2023)	Climate change at a crossroads: Embedding environmental sustainability into the core of pharmacy education
81	Mebane, M. E., Benedetti, M., Barni, D., & Francescato, D. (2023)	Promoting climate change awareness with high school students for a sustainable community

82	Mengi Us, F. (2019)	Sürdürülebilir gelişme için çevre eğitimi aracılığıyla ortaokul öğrencilerinde çevre bilinci ve eleştirel düşünme becerisi geliştirmeye yönelik bir eylem araştırması
83	Mercan, G. (2023)	Türkiye Çevre Eğitim Vakfı (TÜRÇEV)'nin çevre eğitimindeki öncü rolü: Sürdürülebilir gelecek için eğitim ve bilinçlendirme çalışmalarının incelenmesi
84	Michel, J. O. (2019).	An assessment of teaching and learning about sustainability across the higher education curriculum
85	Mirica, A., Petcu, I. R., Catrina, L., Partas-Ciolan, R. V., & Neamtu, A. A. (2023)	Sustainability competences in Romanian higher education
86	Mongar, K. (2022)	Teachers' preparedness to teach environmental science in Bhutan
87	Muldrow, L., Chambers, B., Newell, M. K., & Salter, A. (2019)	sustainability infused across the curriculum at a minority-serving liberal arts institution: A case study
88	Muşlu Kaygısız, G. (2020)	Aktif öğrenmeye dayalı etkinliklerin sınıf öğretmen adaylarının sürdürülebilir çevreye yönelik tutumlarına, olumlu davranışlarına ve çevre tutumlarına etkisi
89	Ogunyemi, B., Ifegbesan, A., Benedict, H. T., Ogunsanya, A. O., Iyunade, O. T., Olubela, A., Itasanmi, B., & Edewor, K. (2022)	Knowledge, perceptions and readiness of Nigeria's beginning teachers for sustainability education
90	Olmos-Gómez, M. D. C., Estrada-Vidal, L. I., Ruiz-Garzón, F., López-Cordero, R., & Mohamed-Mohand, L. (2019)	Making future teachers more aware of issues related to sustainability: An assessment of best practices
91	Ozkan, B. (2021)	The effect of drama-based activities on environmental sustainability behaviors of 60-72 months-old children
92	Özburak, Ç. (2021)	Sustainable life practice for preschool pupils: Sustainable environmental education program (SEEP) model
93	Özçelik, R. (2019)	Lise ve üniversite öğrencilerinin çevresel risk algıları ile sürdürülebilir çevreye yönelik davranışlarının incelenmesi
94	Özkan, B., & Tugluk, M. N. (2022)	The effect of the brain-based environmental education program applied to 5-6 years of pre-school children on their sustainable environmental behaviors
95	Pache, A., Glaudel, A., & Partoune, C. (2023)	Editorial: Environmental and sustainability education in compulsory education: Challenges and practices in Francophone Europe
96	Pehoiu, G. (2019)	Percept of teachers regarding integration of education for environment and sustainable development in primary schools
97	Pozo-Muñoz, M. P., Martín-Gámez, C., Velasco-Martínez, L. C., & Tójar-Hurtado, J. C. (2023)	Research and development of environmental awareness about water in primary education students through their drawings
98	Prabawani, B., Hadi, S. P., Zen, I. S., Afrizal, T., & Purbawati, D. (2020)	Education for sustainable development as diffusion of innovation of secondary school students
99	Purwanto, A., Ichsan, I. Z., Gomes, P. W. P., & Rahman, M. M. (2020)	ESBOR during COVID-19: Analysis students attitude for develop 21st century environmental learning

100	Quiroz-Martinez, D. (2024)	Chemistry teachers' perspectives and understanding in integrating sustainability into teaching: The case of Chile
101	Reid, A. (2020)	Researching environmental and sustainability education policy: Slumbers and awakenings
102	Ronaghi, M. H. (2023)	The effect of virtual reality technology and education on sustainable behavior: A comparative quasi-experimental study
103	Sahin, E., & Alici, S. (2019)	An associational study on pre-service early childhood teachers' nature relatedness in education for sustainability
104	Samur, H., & Akman, Ö. (2023)	Analysis of environmental literacy levels of social studies pre-service teachers
105	Sánchez-Carracedo, F., Ruiz-Morales, J., Valderrama-Hernández, R., Muñoz-Rodríguez, J. M., & Gomera, A. (2021)	Analysis of the presence of sustainability in higher education degrees of the Spanish university system
106	Santos-Pastor, M. L., Ruiz-Montero, P. J., Chiva-Bartoll, O., Baena-Extremera, A., & Martínez-Muñoz, L. F. (2022)	Environmental education in initial training: Effects of a physical activities and sports in the natural environment program for sustainable development
107	Saraçlı, S., & Boca, G. D. (2021)	Factors influencing students' environmental behavior for sustainable development
108	Schnittka, C. G. (2023)	Preservice teachers learn: How coal keeps the lights on
109	Skold, S. (2020)	Ecological art exhibition as transformative pedagogy
110	Stewart, V. (2023)	Effects of transformative sustainability education in accounting on male and female students attitudes toward sustainable development
111	Sunzuma, G., & Luneta, K. (2023)	An evaluation of secondary school mathematics textbooks in light of sustainable education in Zimbabwe
112	Şeker, M. (2023)	A study on how environmental issues are discussed in social studies textbooks
113	Tahkol, D. (2023)	Hemşirelik öğrencilerinin sürdürülebilir kalkınma tutumları ve iklim değişikliğine yönelik bilgi düzeyleri
114	Tahkol, D., & Öztürk Haney, M. (2024)	Determinants of Turkish nursing students' attitudes towards sustainable development and knowledge of climate change: A descriptive and correlational study
115	Takshe, A. A., Hennawi, M., Jebri, S. E., Alawi, S., AlZaidan, S., & Okasha, A. (2023)	Investigating determinants of pro-environmental behaviors amongst UAE university students through Q-methodology
116	Tarı, A. (2023)	Okul öncesi öğretmenlerinin çevresel sürdürülebilirlik hakkındaki görüşlerinin incelenmesi
117	Tarman, I., & Kukurtcu, S. K. (2022)	The perceptions of the children attending the preschool education about nature and nature pollution
118	Tekiroğlu, A. (2021)	Sosyal bilgiler öğretmenlerinin çevre etiği farkındalıkları ve sürdürülebilir çevreye yönelik tutumları arasındaki ilişkisinin çeşitli değişkenler açısından incelenmesi
119	Temiz, N. (2020)	Çevreye yönelik farklı tutum gösteren okul öncesi öğretmenlerinin sınıf içi çevresel sürdürülebilirlik uygulamalarına ilişkin çoklu durum çalışması
120	Tetik, A. (2023)	İlkokul öğrencilerinin sürdürülebilir çevre algılarının resim analizi aracılığıyla belirlenmesi

121	Tokur, F. (2019)	Çevreye ilişkin duygu boyutu kazandırılmış etkinliklerin fen bilimleri öğretmen adaylarının çevre okuryazarlıklarına ve sürdürülebilir çevreye yönelik tutumlarına etkisi
122	Tuay-Sigua, R. N., Pérez-Mesa, M. R., & Porras-Contreras, Y. A. (2023)	Teachers' ideas and educational experiences regarding urban environmental sustainability in Bogotá
123	Umurhan, B. (2022)	Öğretmen adaylarının küresel iklim değişikliğine ilişkin bilgi, tutum ve davranışlarının incelenmesi
124	Uyanık, S. (2021)	Fen bilgisi ve sosyal bilgiler öğretmen adaylarının sürdürülebilir çevre ile ilgili tutumlarının incelenmesi
125	Verma, R., & Grover, P. (2021)	Role of social media in promotion of green school initiatives by government green schools in India
126	Weatherhead, N. K. (2020)	Integrated techniques to increase systems thinking for sustainability education of high school science students using educational design research
127	Wilson, T. (2019)	Experiences of faculty in the design and development of sustainability education in higher education curricula: A case study of a southeastern college
128	Wilujeng, I., Dwandaru, W. S. B., & Rauf, R. B. A. (2019)	The effectiveness of education for environmental sustainable development to enhance environmental literacy in science education: A case study of hydropower
129	Winter, J., Zhai, J., & Cotton, D. R. E. (2022)	Teaching environmental sustainability in China: Opportunities and challenges for business and economics faculty in higher education
130	Yahampath, D. I. M. (2023)	Exploring pre-service teachers' perceptions about the use of school gardens in education for sustainability
131	Yazıcı, H., Kıvrak, E., Koca, N., Koca, M. K., Gökdemir, A., & Ekiz, E. (2021)	Benefits of an ecology-based nature education program: An evaluation on the basis of participants' experiences
132	Yen, T. T. K., Huyen, N. T., Hien, N. V., & Van Phuc, D. (2023)	Research on Factors of fun activities affecting the sustainable environmental behaviour of preschoolers (from 3 to 6 years old)
133	Yıldırım, G. (2020)	Sürdürülebilirlik konusundaki eğitim araştırmalarının tematik olarak incelenmesi
134	Yıldız, K., Güzel Gürbüz, P., Esentaş, M., Beşikçi, T., & Balıkcı, İ. (2021)	Üniversite öğrencilerinin sürdürülebilir çevre eğitimi ve çevre sorunlarına yönelik tutumları arasındaki ilişkinin incelenmesi
135	Yıldız, O. (2019)	Sosyal bilgiler öğretmenlerinin çevre bilgisi ve sürdürülebilir çevre tutum düzeyleri arasındaki ilişkinin incelenmesi
136	Yılmaz, H. (2023)	Tübitak bilim çocuk dergilerinin sürdürülebilir çevre içerikleri bakımından incelenmesi
137	Yiğit, K. (2019)	Sürdürülebilir yaşam için geri dönüşüm eğitiminin 8. sınıf öğrencilerinin çevre bilincine etkisi
138	Yli-Panula, E., Jeronen, E., Koskinen, S., & Mäki, S. (2022)	Finnish university students' views on climate change education and their own ability to act as climate educators
