International Online Journal of Education and Teaching (IOJET), Vol. 13 , No. 4, 2026 (pp. 267-287)

RESEARCH ARTICLE WWW:IoJet.org

Self-efficacy Perceptions of 4th Grade Primary School Students towards Sustainable Environmental Education: A Scale Development Study

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Keywords:

Self-efficacy,
Sustainable environmental education,
Scale development

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Received : 03.03.2026
Revised : 27.07.2026
Accepted : 30.07.2026

Abstract

Sustainable environmental education aims to foster awareness and sustainable behaviors, where individuals' self-efficacy perceptions are a crucial determining factor. In this process, individuals' self-efficacy perceptions regarding sustainable environmental education are considered a determining factor in the emergence of environmental behaviors. Accordingly, this study aimed to develop the Sustainable Environmental Education Self-Efficacy Scale (SEESES) for fourth-grade students and examine its psychometric properties. The study involved 651 fourth-grade students attending public primary schools affiliated with the Turkish Ministry of National Education in a provincial center of the Aegean Region during the 2024–2025 academic year. Participants were selected through a convenience sampling strategy. The scale refinement process yielded a four-dimensional instrument comprising 28 items. The four dimensions were identified as Sensitivity, Responsibility, Supporting Waste Management, and Protecting Natural Resources and Protecting Natural Resources. Findings from the exploratory and confirmatory factor analyses consistently supported the four-dimensional organization of SEESES, providing strong evidence for the construct validity of the instrument.In addition, the internal consistency coefficients obtained for the total scale and its subscales indicated a high level of reliability. Overall, the findings demonstrate that the SEESES is a psychometrically sound instrument that can be employed in future studies and educational practices related to sustainable environmental education.

How to cite this article: Selmanoğlu E, Dinçer B (2026). Self-efficacy Perceptions of 4th Grade Primary School Students towards Sustainable Environmental Education: A Scale Development Study. International Online Journal of Education and Teaching, Vol. 13, No. 4, 2026, 267-287

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Introduction

In the twenty-first century, rapid industrialization and continuous population growth have intensified environmental degradation, making environmental problems one of the most critical challenges facing societies worldwide. Addressing these challenges requires enhancing individuals' knowledge of environmental issues while fostering environmental awareness and responsibility. Environmental education is crucial for cultivating such awareness and ensuring its continuity. In recent decades, environmental education has become increasingly important in response to escalating environmental problems and the growing impacts of climate change. Within this context, sustainable environmental education serves as a fundamental approach for generating solutions to environmental challenges and ensuring a more livable world for future generations.

The primary objectives of environmental education include educating individuals who possess knowledge about the environmental issues and promote environmental consciousnes, sensitivity and generate effective solutions when confronted with environmental issues, and utilize social, economic, and environmental resources (Ministry of National Education [MoNE], 2006, pp. 5, 60; MoNE, 2013, p. 2; MoNE, 2017, p. 5; Tbilisi Declaration, 1977). Engin (2010) defines environmental sustainability as ensuring that natural resources are not consumed faster than their capacity for regeneration while simultaneously controlling activities that contribute to environmental pollution.

A historical examination of environmental education reveals that concerns regarding environmental degradation first emerged during the Industrial Revolution, when discussions began regarding potential solutions to increasingly severe environmental problems. Environmental education subsequently came to be recognized as one of the most effective means of environmental protection. The 1977 Tbilisi Declaration identified environmental education as an interdisciplinary learning process that encourages individuals and communities to take an active role in understanding and addressing environmental challenges.The conference also established the fundamental principles, objectives, and implementation strategies of environmental education (UNESCO-UNEP, 1978).

Similarly, during the National Seminar on Environmental Education, National Environmental Strategy and Action Plans for Turkey, jointly organized by UNESCO and the Turkish Undersecretariat for the Environment in 1990, Environmental education has been conceptualized as a lifelong learning process that seeks to enhance environmental awareness, encourage responsible and sustainable behaviors, safeguard natural, historical, cultural, and aesthetic values, promote active public engagement, and empower individuals to take responsibility for addressing environmental challenges(Özoğlu, 1993). Hungerford and Peyton (1986) described environmental education as the process of cultivating environmentally literate individuals who recognize environmental problems and actively seek solutions, whereas Şimşekli (2004) emphasized that its primary purpose is the protection of nature and natural resources. UNESCO (2017) further emphasizes that the continuity of human societies depends upon the existence of a sustainable environment, highlighting the indispensable role of environmental education in achieving environmental sustainability.

Contemporaryperspectives describe sustainability through three interconnected dimensions—environmental, economic, and social.Fundamentally, sustainability refers to the capacity to maintain long-term well-being and prosperity. The environmental dimension emphasizes protecting natural systems by promoting the responsible management of natural resources and maintaining the ecosystem services on which human well-being depends.This includes protecting biodiversity, maintaining water and air quality, mitigating environmental crises including climate shifts, as well as securing the responsible management of Earth's resources.

Sustainable environmental education seeks to raise awareness of environmental challenges among individuals and communities while encouraging behaviors and decision-making processes that are consistent with the principles of sustainability. Accordingly, sustainable environmental education addresses topics such as environmental protection, sustainable resource management, climate change, waste management, and renewable energy. According

to Sinakou (2019), the principal components and objectives of sustainable environmental education include:

- *Developing environmental awareness and consciousness*: enabling individuals to understand environmental problems and recognize the environmental consequences of their daily decisions.
- *Promoting environmental action*: encouraging learners to adopt sustainable behaviors such as recycling, energy conservation, and environmentally responsible consumption.
- *Employing an interdisciplinary perspective*: integrating knowledge from science, social sciences, technology, and mathematics to facilitate a comprehensive understanding of environmental issues.
- *Enhancing community participation*: fostering active public engagement and collaborative learning processes that encourage environmentally responsible citizenship.
- *Cultivating responsibility toward future generations*: emphasizing the long-term consequences of present-day decisions andpromoting the responsible use and long-term protection of natural resources for the benefit of future generations.
- *Understanding global environmental interdependence*: enhancing learners' understanding of the complex nature of global environmental problems and highlighting the value of international collaboration in responding to challenges such as climate change.

Ultimately, sustainable environmental education represents one of the most effective means of enabling individuals to understand their environmental responsibilities and translate this understanding into meaningful action. It contributes significantly to building environmentally conscious societies capable of achieving a sustainable future.

Sustainable environmental education is an educational approach that aims to cultivate individuals who understand environmental values, protect natural resources, and demonstrate environmentally responsible behaviors. Through this type of education, individuals develop a deeper understanding of the importance of environmental conservation and are encouraged to adopt environmentally responsible practices in their daily lives. Sustainable environmental education influences not only individuals but also society. Strengthening environmental awareness and responsibility among members of society is essential for responding effectively to today's environmental challenges.Furthermore, sustainable environmental education promotes the efficient use of natural resources and facilitates the widespread adoption of sustainable practices, such as recycling and resource conservation. The significance of sustainable environmental education extends beyond the present generation to future generations. In a world where natural resources are finite and environmental problems continue to intensify, Sustainable environmental education is indispensable for protecting the well-being of upcoming generations and cultivating a resilient, habitable world.

Within this context, sustainable environmental education at the primary school level is of paramount importance for enhancing students' environmental awareness and encouraging sustainable behaviors. Sustainable environmental education equips individuals with knowledge about environmental issues while fostering their ability to translate this knowledge into meaningful action. Accordingly, teaching frameworks focus on maximizing resource efficiency and maintaining ecological integrity. Introducing these concepts during the early years of primary education and fostering environmental awareness at an early age establish a strong foundation for the lifelong development of sustainability consciousness. Therefore, providing environmental education to children and young people is expected to contribute significantly to raising future generations as environmentally conscious and responsible citizens who can respond effectively to environmental challenges (Şimşekli, 2004).

Sustainable Environmental Education in Türkiye

Environmental education in Türkiye has undergone significant development since the foundation of the Republic up to contemporary times. Throughout this period, environmental awareness has gradually

evolved from a conservation-oriented perspective toward a broader understanding of sustainability.

During the 1940s, increasing global awareness of environmental issues led to the emergence of environmental protection initiatives in Türkiye. Legal frameworks aimed at safeguarding ecological and historical assets were enacted, alongside the foundation of agencies dedicated to environmental oversight. One of the earliest legal arrangements was the Law on Antiquities, enacted in 1943, which aimed to preserve both historical and natural assets (Madran, 1996).

Environmental education gained considerable momentum with the establishment of the Village Institutes (Köy Enstitüleri) on 17 April 1940. These institutions were founded not only to educate rural populations but also to improve their relationship with the natural environment. Sustainable agricultural practices, environmental stewardship, and harmonious coexistence with nature constituted essential components of their educational philosophy. Rather than limiting environmental education to science or agriculture courses, the Village Institutes integrated environmental awareness into practical daily life, encouraging efficient use of natural resources and responsible interaction with land and water. This approach laid the foundations for environmental education in Türkiye and later facilitated its incorporation into formal school curricula (Akyüz, 2015; Yalçın, 2010).

Beginning in the 1950s, environmental education became increasingly systematic. Academic research expanded, and environmental awareness was gradually incorporated into teacher education programs. During the 1970s, growing international concern regarding environmental degradation accelerated environmental education initiatives in Türkiye (Atasoy, 2005).

The 1972 Stockholm Conference, formally organized by the UN to address the human environment represented a milestone in the international environmental movement and substantially influenced environmental policies in Türkiye. Following the Stockholm Declaration, the International Environmental Education Programme (IEEP) was launched in 1975 as a collaborative initiative of UNESCO and UNEP (Gönençgil, 2007). These developments encouraged the systematic integration of environmental education into Turkish educational policies.

During the 1980s, environmental education received increasing attention within both academic research and teacher education. A notable milestone was the publication of *Turkey's Biological Richness* by the Turkish Foundation for Environmental Problems in 1987, which became an important reference for environmental protection and environmental education (Çakır Sümer, 2007). These developments culminated in the inclusion of the course Environment, Health, Traffic and Reading within the primary school curriculum in 1992 (Ünal & Dımışkı, 1999). At the secondary level, an elective course entitled Environment and Human was also introduced. These curricular reforms reflected Türkiye's increasing alignment with international environmental policies and the growing emphasis placed on sustainable development.

The comprehensive curriculum reform implemented in 2004 represented another turning point. Environmental education began to be delivered through a constructivist educational approach and was integrated across multiple subject areas rather than being confined to a single discipline (Özsoy & Ahi, 2014). Environmental and sustainability-related concepts were incorporated into Life Sciences, Science, and Social Studies courses in primary education, while secondary school curricula included environmental topics within science, geography, and biology courses. Furthermore, an elective Environmental Education course was introduced at the middle school level (MoNE, 2018). These reforms emphasized developing students' environmental problem-solving skills rather than merely transmitting environmental knowledge.

The national curriculum framework, introduced as the Türkiye Century Education Model, implemented beginning with the 2024–2025 academic year, further strengthened the integration of environmental education and sustainability throughout the national curriculum. The model aims to cultivate environmentally responsible citizens by enhancing students' environmental awareness, sustainability competencies, and sense of responsibility. Environmental education is primarily addressed within Science, Geography, and Social Studies, where students develop an under-

standing of ecosystems, human–environment interactions, environmental challenges, and sustainable development (MoNE, 2024).

A distinguishing characteristic of the Türkiye Century Education Model is its interdisciplinary perspective on sustainability. Woven throughout various fields of study, sustainable development objectives empower students to build a multidimensional understanding of sustainability's ecological, social, and financial facets. Consequently, learners are expected to develop sustainable lifestyles and contribute responsibly to society as environmentally conscious citizens (Education Reform Initiative, 2024).

The curriculum also places strong emphasis on experiential learning. Rather than limiting environmental education to theoretical instruction, students participate in authentic learning experiences through school gardens, ecological agriculture projects, recycling activities, and other hands-on environmental practices. In addition, developing students' competencies in addressing climate change, energy conservation, environmental ethics, and sustainable resource management has become one of the central objectives of the curriculum (Turkish Education Association, 2024). Such experiences are expected to cultivate environmentally responsible individuals who can generate practical and sustainable solutions to contemporary environmental problems.

The report published by the Ministry of Science, Industry and Technology (2015) highlights the growing emphasis placed on environmental education, recycling, waste management, and sustainability by governmental as well as non-governmental organizations.Within this context, Türkiye's national action plan identified five major objectives:

- promoting recycling awareness throughout society.
- encouraging and supporting scientific research on recycling.
- establishing regulations that facilitate resource recovery from waste.
- providing economic incentives for recycling activities; and
- developing an effective national waste management and monitoring system.

The primary objective of the action plan is to foster awareness of resource recovery and recycling across all segments of society regardless of age, gender, or socioeconomic status. To achieve this objective, several educational strategies have been proposed, including integrating recycling concepts into all educational levels beginning with preschool education, preparing educational materials such as guidebooks, brochures, and public service announcements for students, organizing professional development programs for teachers, and developing both formal and non-formal educational programs aimed at preparing qualified professionals in sustainability and environmental education.

Collectively, these initiatives demonstrate that environmental education in Türkiye has evolved from a knowledge-oriented perspective toward a competency-based framework emphasizing environmental awareness, sustainability literacy, responsible citizenship, and active environmental participation. This transformation reflects both national educational priorities and international sustainability agendas, highlighting the increasingly central role of environmental education in preparing future generations to address complex environmental challenges.

Self-Efficacy Perception

This research anchors its understanding of self-efficacy within Bandura's (1997) Social Cognitive Theory. From this theoretical perspective, the construct reflects a person's conviction in their capacity to plan and carry out the necessary steps to achieve specific outcomesAccording to Bandura (1997, 2006), rather than representing actual competence, the construct designates personal evaluations of one's ability to accomplish given activities, which is entirely distinct from their objective skill level.

According to Bandura (1995, 1997), perceived self-efficacy constitutes one of the fundamental determinants of human behavior and performance. Self-efficacy influences not only behavioral outcomes but also individuals' goal setting, outcome expectations, emotional responses, persistence, and perceptions of obstacles encountered within their social environment. Individuals possessing strong self-efficacy beliefs tend to approach challenging

situations with confidence, demonstrate greater perseverance in the face of difficulties, and recover more rapidly following setbacks.

When this theoretical perspective is applied to sustainable environmental education, students' environmental self-efficacy becomes a critical factor influencing the development of environmentally responsible behaviors. Students with stronger self-efficacy beliefs are more likely to adopt environmentally responsible behaviors and actively participate in sustainability-related practices. Consequently, they are expected to establish personal environmental goals, remain committed to environmentally responsible behaviors, and actively seek solutions to environmental problems.Moreover, Bandura's theory suggests that individuals' responses to obstacles are largely determined by their self-efficacy beliefs. Within the context of sustainable environmental education, students who possess a strong sense of self-efficacy regarding their ability to make a positive environmental impact demonstrate a greater propensity to persist despite barriers. Their beliefs regarding their ability to separate waste, conserve natural resources, reduce water consumption, and make environmentally responsible lifestyle choices directly influence the likelihood of engaging in sustainable environmental behaviors.

Therefore, fostering environmental self-efficacy during primary school years may contribute substantially to the development of lifelong environmentally responsible attitudes and behaviors. Since self-efficacy beliefs formed during childhood tend to influence future behavioral patterns, strengthening these beliefs through sustainable environmental education constitutes an important educational objective.

Significance of the Study

Instructional initiatives centered on the environment are indispensable for expanding ecological literacy and cultivating long-term sustainable habits. Notably within the current global context, as accelerated urban expansion and escalating pollution levels jeopardize ecological balance, it is imperative that environmental instruction be initiated at the onset of formal education and extended to all demographics (Grimm et al., 2008). Early environmental education enables children and young people to develop environmental responsibility, thereby preparing future generations to become environmentally conscious citizens capable of addressing complex environmental challenges (Şimşekli, 2004).

Despite the growing emphasis placed on sustainability education within educational systems, relatively few measurement instruments have been specifically designed to assess primary school students' self-efficacy regarding sustainable environmental education. Existing instruments generally focus on environmental attitudes, awareness, or knowledge, while relatively limited attention has been devoted to students' beliefs concerning their own capability to perform environmentally responsible behaviors. To address this gap,the current study introduces and validates the Sustainable Environmental Education Self-Efficacy Scale (SEESES)specifically for fourth-grade primary school students. In addition to presenting evidence regarding the validity and reliability of the instrument, the study provides a measurement tool that can be employed by researchers, teachers, curriculum developers, and policymakers to evaluate students' perceptions of self-efficacy related to sustainable environmental education. The Sustainable Environmental Education Self-Efficacy Scale developed within this study is also expected to contribute significantly to the literature by providing a psychometrically sound instrument specifically designed for primary school students. Furthermore, SEESES can serve as a valuable instrument for examining the outcomes of environmental education initiatives while providing educators with evidence to develop practices that enhance students' confidence in adopting sustainable environmental behaviors.

Method

Research Design

This study is a methodological scale development study employing a descriptive survey design to develop a valid and reliable instrument for measuring fourth-grade primary school students' self-efficacy perceptions regarding sustainable environmental education (Karasar, 2012).

According to DeVellis (2016), a scale is a measurement instrument composed of multiple items that collectively generate a composite score representing theoretical constructs that cannot be directly observed. Since self-efficacy is a latent psychological construct that cannot be measured through direct observation, a scale development approach was considered the most appropriate methodology for the present study.

Study Group

The participants comprised 651 fourth-grade students attending public primary schools under the Turkish Ministry of National Education in a provincial city in the Aegean Region during the 2024–2025 academic year. The study relied on convenience sampling, a non-probability sampling technique that includes participants who are readily available and willing to take part in the research (Walliman, 2006).This sampling strategy enabled the researchers to obtain an adequate sample size efficiently, thereby ensuring sufficient statistical power for the psychometric analyses required during scale development.

Regarding sample size recommendations for scale development studies, Guilford (1954) suggested that at least 200 participants are required, whereas Nunnally (1978) recommended a sample size approximately ten times the number of items. Tavşancıl (2006) proposed a participant-to-item ratio ranging between five and ten, while Tabachnick and Fidell (2013) recommended a minimum sample size of 300 observations for factor analysis. The number of participants included in the study was well above the recommended minimum, providing an adequate basis for conducting both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA).

Sample characteristics of the study group were given in Tablo 1.

Among the 651 participants, 316 (48.5%) were female and 335 (51.5%) were male. Most students (74.3%) were born in 2014, whereas 25.7% were born in 2013. In terms of sibling status, 8.6% of the students had no siblings, 57.9% had one sibling, 27.2% had two siblings, and the remaining 6.3% had three or more siblings.Regarding environmental engagement, 43.9% of the participants reported participating in activities organized by the Turkish Foundation for Combating Soil Erosion (TEMA) and other non-governmental organizations, whereas 56.1% had no such experience. Additionally, 59.9% reported checking whether purchased products were environmentally harmful before buying them, while

Table 1: Sample characteristics of the study group

Variables		n	%
Gender	Girl	316	48,5
	Boy	335	51,5
Year of Birth	2013	167	25,7
	2014	484	74,3
Number of siblings	Only child	56	8,6
	One sibling	377	57,9
	2 siblings	177	27,2
	3 siblings and above	41	6,3
Participation in Environmental Activities Organized by Non-Governmental Organizations (e.g., TEMA)	Yes	286	43,9
	No	365	56,1
Checking Whether Purchased Products Are Environmentally Harmful Before Purchasing	Yes	390	59,9
	No	261	40,1
Participation in an Environmental Project	Yes	388	59,6
	No	263	40,4
Total		651	100.0

40.1% indicated that they did not consider this issue during purchasing decisions. Finally, 59.6% stated that they had previously participated in an environmental project, whereas 40.4% reported no such experience.

Scale Development Process

The development of the Sustainable Environmental Education Self-Efficacy Scale (SEESES) followed the eight-stage scale development procedure proposed by DeVellis (2016), together with additional guidance derived from Bandura's (2006) methodological framework for self-efficacy measurement.

Stage 1: Defining the Construct

The first stage involved establishing a clear conceptual framework for the constructs intended to be measured. A thorough examination of both national and international studies, concerning environmental education, environmental awareness, sustainability, and self-efficacy was conducted (e.g., Bandura, 2006; Başaran Uğur et al., 2019; Çelikbaş, 2016; Gıcır et al., 2020; Hatiboğlu & Mercan, 2023; Kahyaoğlu, 2016; Özdemir et al., 2009). Although numerous instruments addressing environmental awareness and environmental attitudes were identified, no contemporary measurement instrument specifically assessing primary school students' self-efficacy regarding sustainable environmental education was found. Therefore, the theoretical framework of the scale was established based on the Life Science Curriculum published by the Ministry of National Education (MoNE, 2024) and Bandura's (1997) theory of self-efficacy.

Stage 2: Item Generation

Drawing on the findings from the preceding stages, an initial set of 60 scale items was prepared to capture the key components of sustainable environmental education self-efficacy.Both positively and negatively worded statements were included. Consistent with Bandura's (2006) recommendations, items were constructed using capability-oriented expressions such as "I can..." to measure perceived capability rather than factual knowledge. Findings obtained from semi-structured interviews with primary school students, teachers, and parents were incorporated into the process of generating the preliminary item pool.

Stage 3: Determining the Response Format

The decision to adopt a five-point Likert-type response format was informed by evidence from the literature, feedback obtained from experts, and the findings of a pilot study conducted with 10 fourth-grade students.

Stage 4: Expert Review

To establish content validity and face validity, the preliminary scale was evaluated by twelve experts representing several disciplines, including environmental education, science education, curriculum and instruction, educational measurement and evaluation, Turkish language education, and experienced primary school teachers.

Experts evaluated each item using three response categories:

- Essential
- Useful but not essential
- Not necessary

They were also invited to provide written recommendations for improving item wording and clarity. Feedback obtained from the experts guided revisions of the preliminary instrument before field implementation.

Stage 5: Inclusion of Control Items

To minimize response bias and identify inattentive responding or socially desirable response tendencies, several reverse-coded control items were incorporated into the preliminary scale.

Stage 6: Pilot Administration

After incorporating the experts' feedback, the revised draft of the scale was implemented with the target group. To evaluate the scale's factorial structure, independent datasets were employed for the Exploratory Factor Analysis (EFA) and the Confirmatory Factor Analysis (CFA).

Stage 7: Psychometric Analyses

The psychometric evaluation of the instrument included analyses of item-total correlations, item discrimination based on the upper-lower 27% score groups, Exploratory Factor Analysis (EFA),

Confirmatory Factor Analysis (CFA), and internal consistency estimated using Cronbach's Apha.

Stage 8: Scale Refinement

Successive psychometric evaluations led to the removal of items that failed to meet the predefined statistical criteria, including inadequate factor loadings and substantial cross-loadings. The refinement process produced a four-dimensional instrument consisting of 28 items:

- Sensitivity
- Responsibility
- Supporting Waste Management
- Protecting Natural Resources

These four dimensions constitute the final structure of the Sustainable Environmental Education Self-Efficacy Scale (SEESES).

Results

Evidence for Construct Validity

The construct validity of the Sustainable Environmental Education Self-Efficacy Scale (SEESES) was investigated using Exploratory Factor Analysis (EFA). Item discrimination was evaluated by comparing participants in the upper and lower 27% score groups through independent-samples *t*-tests, allowing the extent to which each item differentiated between high- and low-scoring individuals to be examined. Prior to these procedures, the assumptions of normality and homogeneity of variance were assessed and found to be satisfactory. The factor structure obtained from the EFA was subsequently cross validated through Confirmatory Factor Analysis (CFA) using data collected from an independent sample. The findings of these analyses are reported sequentially in Tables 1–6.

Prior to performing the Exploratory Factor Analysis (EFA), the appropriateness of the dataset for factor extraction was evaluated using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity. The obtained KMO coefficient was .873, reflecting a level of sampling adequacy that supports the application of factor analysis. According to Altunışık et al. (2010), KMO values between .50 and 1.00 indicate that the data are appropriate for factor analysis, whereas values below .50 suggest that factor analysis is not suitable. Bartlett's Test of Sphericity yielded a statistically significant result, $x^2(378) = 5366.915$, $p < .001$, indicating that the inter-item correlations were sufficient to justify factor extraction. Taken together with the KMO findings, these results supported the suitability of the data for exploratory factor analysis.

The initial item pool consisted of 48 items. During the Exploratory Factor Analysis, 20 items (SCET1, SCET5, SCET10, SCET13, SCET14, SCET17, SCET20, SCET21, SCET24, SCET29, SCET30, SCET31, SCET33, SCET35, SCET39, SCET40, SCET43, SCET44, SCET46, and SCET48) were removed because they exhibited low factor loadings or substantial cross-loadings. The remaining 28 items were grouped into four distinct factors, representing the final structure of the scale.

The four-factor solution explained 43.64% of the total variance. According to Çokluk et al. (2018), an explained variance exceeding 40% is considered acceptable for multidimensional measurement instruments, indicating satisfactory construct validity.

The four factors were interpreted as follows:

- Factor 1: Sensitivity
- Factor 2: Responsibility
- Factor 3: Supporting Waste Management
- Factor 4: Protecting Natural Resources

The reliability coefficients for the four dimensions ranged from .554 to .865, while the overall Cronbach's alpha coefficient of the scale was .893, indicating high internal consistency.

Table 3 summarizes the item discrimination analysis, which was performed by applying independent-samples *t*-tests to the upper and lower 27% score groups.Participants were ranked according to their factor scores, and the upper and lower 27% of the score distribution were subsequently selected for comparison.Mean differences between these groups were tested statistically. The results demonstrated that all 28 items significantly discriminated between participants with low and high self-efficacy perceptions ($p < .001$ for every item).

The obtained *t*-values ranged from approximately −10.57 to −21.99, indicating that every item possessed strong discriminatory power. These findings provide substantial evidence that the retained items effectively differentiate students with varying levels of sustainable environmental education self-

Table 2: Exploratory Factor Analysis Results of the Sustainable Environmental Education Self-Efficacy Scale

Items	Factors				Total Item Correlations
	F1: Sensitivity	F2: Responsibility	F3:Supporting Waste Management	F4: Protecting Natural Resources	
SCET34	0.679				0.576
SCET23	0.662				0.551
SCET41	0.636				0.580
SCET37	0.618				0.584
SCET32	0.571				0.512
SCET12	0.563				0.503
SCET36	0.553				0.512
SCET26	0.538				0.540
SCET2	0.528				0.483
SCET45	0.525				0.527
SCET42	0.512				0.545
SCET4	0.499				0.568
SCET6	0.477				0.497
SCET7		0.701			0.505
SCET18		0.668			0.478
SCET16		0.577			0.514
SCET9		0.530			0.410
SCET22		0.529			0.434
SCET27		0.501			0.416
SCET15			0.618		0.397
SCET28			0.608		0.486
SCET3			0.586		0.424
SCET38			0.565		0.465
SCET19			0.538		0.386
SCET8			0.511		0.358
SCET47				0.705	0.408
SCET11				0.666	0.403
SCET25				0.600	0.324
Reliability (Cronbach's α)	0.865	0.725	0.687	0.554	0.893
Explained Variance (%)	17.064	10.047	9.335	7.189	43.635
Note. KMO = .873; Bartlett's Test of Sphericity: $x^2(378) = 5366.915$, $p < .001$.					

efficacy.

Examination of the correlations among the variables indicated that all factor loadings exceeded the recommended threshold of .30, and all correlations were statistically significant. The confirmatory factor analysis provided additional support for the four-

Table 3.Item Discrimination Analysis Results

Factors	Items	t (Upper-Lower 27%)	p(Upper-Lower 27%)
F1: Sensitivity	SCET34	-15.176	0.000*
	SCET23	-18.453	0.000*
	SCET41	-14.418	0.000*
	SCET37	-13.399	0.000*
	SCET32	-13.175	0.000*
	SCET12	-16.594	0.000*
	SCET36	-13.239	0.000*
	SCET26	-10.574	0.000*
	SCET2	-15.574	0.000*
	SCET45	-12.481	0.000*
	SCET42	-13.982	0.000*
	SCET4	-15.195	0.000*
	SCET6	-13.339	0.000*
F2: Responsibility	SCET7	-13.110	0.000*
	SCET18	-15.495	0.000*
	SCET16	-16.699	0.000*
	SCET9	-15.115	0.000*
	SCET22	-21.987	0.000*
	SCET27	-15.473	0.000*
F3: Supporting Waste Management	SCET15	-14.198	0.000*
	SCET28	-16.526	0.000*
	SCET3	-18.882	0.000*
	SCET38	-17.309	0.000*
	SCET19	-12.635	0.000*
	SCET8	-12.975	0.000*
F4: Protecting Natural Resources	SCET47	-15.655	0.000*
	SCET11	-16.792	0.000*
	SCET25	-19.296	0.000*

*p<0.05

factor structure, indicating that the 28 items were appropriately associated with their hypothesized dimensions (see Table 5).

To improve the overall model fit, modification procedures were performed. During this process, parameters that adversely affected model fit were identified, and covariance paths were specified between error terms with high modification indices where theoretically justifiable. Following these modifications, the model fit indices were recalculated. After the recommended modifications were implemented, the measurement model showed satisfactory fit to the observed data. The obtained fit statistics were within the commonly accepted thresholds, providing support for the adequacy of the proposed factor structure.

The final fit indices of the revised measurement model are presented in Table 5.

Reliability Analysis

The reliability of the SEESES was evaluated using item-total correlations, Cronbach's alpha coefficients, and the split-half reliability method. Cronbach's alpha coefficient for the overall scale was calculated as α = .893, indicating excellent internal consistency. According to Hinton et al. (2004), Cron-

bach's alpha values above .70 reflect satisfactory reliability, whereas values approaching .90 indicate a highly reliable measurement instrument. Split-Half reliability results of the sustainable environmental education self-efficacy scale was shown in Table 6.

As seen in table 6, Split-half reliability was examined using the Spearman–Brown coefficient. The obtained values were:

- Spearman–Brown coefficient = .854
- Guttman Split-Half coefficient = .853
- Correlation between the two halves = .745

Because all coefficients exceeded the recommended threshold of .70 (Lord & Novick, 1968), the results further support the reliability of the instrument. The finalized SEESES includes 28 statements, each evaluated using a five-point Likert-type response format ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Three items (Items 26, 27, and 28) are reverse scored.

The four subscales are organized as follows:

- Items 1–13: Sensitivity
- Items 14–19: Responsibility
- Items 20–25: Supporting Waste Management
- Items 26–28: Protecting Natural Resources

Total scores are interpreted so that higher values reflect stronger self-efficacyregarding sustainable environmental education.

The combination of high internal consistency, satisfactory split-half reliability, and strong construct validity demonstrates that the SEESES is a psychometrically sound instrument suitable for assessing fourth-grade primary school students' self-efficacy perceptions related to sustainable environmental education.

Conclusion, Discussion, and Implications

The findings obtained from the psychometric analyses suggest that the Sustainable Environmental Education Self-Efficacy Scale (SEESES) is a psychometrically sound instrument for assessing fourth-grade primary school students' self-efficacy in sustainable environmental education. The finalized instrument includes 28 items distributed across four interrelated dimensions.

The four factors identified through the analyses were conceptualized as Sensitivity, Responsibility, Supporting Waste Management, and Protecting Natural Resources. This factor structure is theoretically consistent with the concepts of self-efficacy and personal agency emphasized in Bandura's (1997) Social Cognitive Theory. While the Sensitivity dimension reflects students' affective readiness to recognize and respond to environmental issues, the Responsibility dimension represents their belief in taking initiative and engaging in actions aimed at addressing environmental problems. The dimensions of Supporting Waste Management and Protecting Natural Resources correspond closely to mastery experiences, which Bandura identifies as the most influential source of self-efficacy beliefs. Students' confidence in performing concrete environmentally responsible behaviors in their daily lives—such as separating recyclable waste, using natural resources efficiently, and preventing water wastage—directly reflects their perceived capability to contribute to environmental sustainability.

Results obtained from the exploratory and confirmatory factor analyses consistently supported the four-dimensional structure of SEESES, indicating that the instrument provides an appropriate representation of the construct it was designed to measure. Reliability analyses indicated that the total scale and each of its subdimensions demonstrated satisfactory internal consistency, providing further support for the use of SEESES as a dependable measure of sustainable environmental education self-efficacy in primary school students.

At both the national and international levels, numerous initiatives have been implemented the proposed instrument may facilitate research exploring the outcomes of sustainable environmental education initiatives in a variety of educational contexts. Malaysia has implemented several environmental education initiatives in collaboration with the Foundation for Environmental Education (FEE), an international non-governmental organization that promotes education for sustainable development through a range of globally recognized environmental

programs.FEE provides an internationally recognized framework for environmental education programs and emphasizes collaboration between governmental and non-governmental organizations in implementing educational initiatives (Mohamoud et al., 2020). Such programs aim to enhance students' understanding of environmental issues while promoting sustainable practices. Evidence from the existing literature indicates that environmental education contributes to substantial improvements environmental awareness among children and adolescents'attitudes, and sustainability-related behaviors (Ardoin et al., 2022).

Moreover, sustainable environmental education contributes to addressing environmental challenges by encouraging the adoption of sustainability-oriented values and behaviors. Evidence from the research suggests that incorporating environmental education into school curricula through initiatives such as the Adiwiyata Program promotes environmental awareness among teachers, students, and members of the local community (Suwantono et al., 2026). These initiatives foster supportive learning environments that encourage sustainable practices while cultivating a sense of environmental responsibility among learners.

Nevertheless, determining whether national and international environmental education programs successfully achieve their intended objectives and produce the expected changes in students' knowledge, attitudes, and behaviors requires rigorous measurement and evaluation procedures. In this regard, the measurement instrument developed in the present study provides a comprehensive tool for assessing

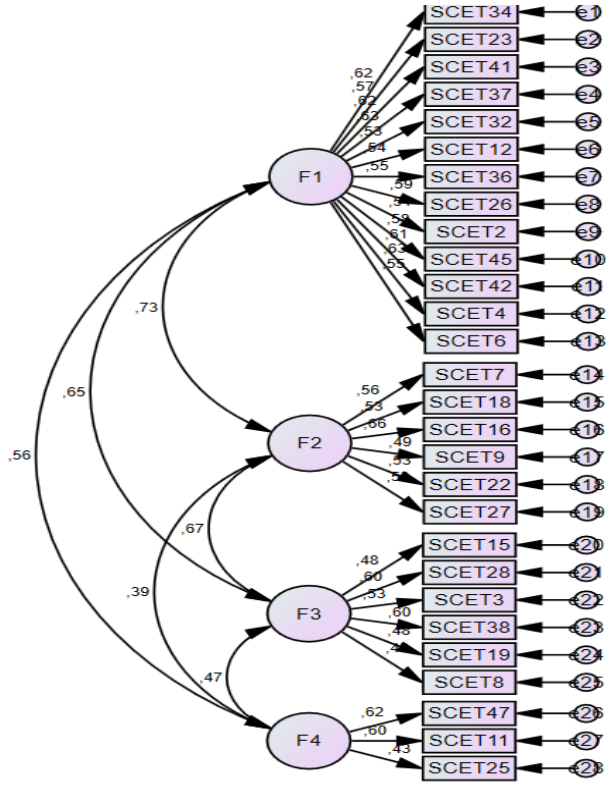

Fig. 1: First-Order Confirmatory Factor Analysis Model of the Scale

Table 4: Measurement Model Results

Factors	Items	Factor Loadings	Standard Error (SE)	t-value	P
F1: Sensivity	SCET34	0.615	-	-	-
	SCET23	0.574	0.086	12.408	***
	SCET41	0.618	0.074	13.153	***
	SCET37	0.627	0.072	13.308	***
	SCET32	0.535	0.069	11.703	***
	SCET12	0.540	0.099	11.804	***
	SCET36	0.554	0.089	12.046	***
	SCET26	0.592	0.079	12.711	***
	SCET2	0.511	0.081	11.266	***
	SCET45	0.580	0.075	12.498	***
	SCET42	0.613	0.090	13.065	***
	SCET4	0.634	0.074	13.421	***
	SCET6	0.545	0.073	11.888	***

Factors	Items	Factor Loadings	Standard Error (SE)	t-value	P
F2: Responbility	SCET7	0.565	-	-	-
	SCET18	0.531	0.076	10.205	***
	SCET16	0.663	0.093	11.762	***
	SCET9	0.490	0.079	9.631	***
	SCET22	0.532	0.092	10.213	***
	SCET27	0.534	0.081	10.243	***
F3: Supporting Waste Managemen	SCET15	0.477	-	-	-
	SCET28	0.598	0.128	9.372	***
	SCET3	0.533	0.147	8.839	***
	SCET38	0.595	0.125	9.349	***
	SCET19	0.484	0.110	8.365	***
	SCET8	0.429	0.097	7.761	***
F4: Protecting Natural Resources	SCET47	0.620	-	-	-
	SCET11	0.600	0.136	8.691	***
	SCET25	0.433	0.069	7.495	***

***p<0.05

Table 5: The goodness-of-fit indices of the SEEESES

Fit Index	Obtained Value	Recommended Value
x^2/df	4.096	≤5
RMSEA	0.069	≤0.10
GFI	0.876	≥0.80
AGFI	0.854	≥0.80
SRMR	0.055	≤0.10

students' self-efficacy regarding sustainable environmental education. Consequently, it offers an important empirical foundation for evaluating the effectiveness of existing and future environmental education programs through evidence-based assessment.

An examination of the existing literature suggests that most available instruments related to sustainable environmental education have been developed primarily for pre-service teachers (Özdemir et al., 2009; Afacan & Demirci Güler, 2011; Aydın & Günaldı,

Table 6. *Split-Half Reliability Results of the Sustainable Environmental Education Self-Efficacy Scale*

Reliability Statistics			
Cronbach's Alpha	Part 1	Value	0.793
		Number of Items	
	Part 2	Alpha	0.837
		Number of Items	
	Number of Items (Total)		28
Correlation Between the Two Halves			0.745
Spearman-Brown Coefficient	Equal Length		0.854
	Unequal Length		0.854
Guttman Split-Half			0.853
Items: SCET2, SCET3, SCET4, SCET6, SCET7, SCET8, SCET9, SCET11, SCET12, SCET15, SCET16, SCET18, SCET19, SCET22. Items: SCET23, SCET25, SCET26, SCET27, SCET28, SCET32, SCET34, SCET36, SCET37, SCET38, SCET41, SCET42, SCET45, SCET47.			

2013; Cirit Gül et al., 2022) or in-service teachers (Özlü et al., 2013). In addition, several qualitative studies have examined sustainable environmental education among teachers and pre-service teachers (Öztürk & Öztürk, 2015; Özkan, 2017; Öztürk & Orhan, 2024; Özgeçen Sağdıç & Şahin, 2024; Şeren & Mert, 2020; Yıldız et al., 2021). In contrast, relatively few instruments are available for evaluating environmental attitudes among middle school students (Yücel & Özkan, 2014; Kılıç & Kan, 2020) and environmental awareness (Çetin & Yalçınkaya, 2018; Olcay & Çukur, 2025). Accordingly, this study contributes to the existing literature through the development of a measurement instrument by providing an instrument specifically tailored to the developmental characteristics of fourth-grade primary school students and designed in accordance with the learning outcomes specified in the current curriculum of the Turkish Ministry of National Education.

Limitations and Recommendations

Although the findings indicate that the Sustainable Environmental Education Self-Efficacy Scale (SEESES) represents a valid, reliable, and practically useful measurement instrument, several limitations should be considered when interpreting the results and the potential applications of the scale.

The participant sample was limited to fourth-grade students enrolled in public primary schools within one provincial center in the Aegean Region of Türkiye. This geographical restriction may reduce the applicability of the findings to other populations. Subsequent studies should validate the scale using more heterogeneous samples representing different regions and school settings to determine whether its psychometric properties remain stable across educational contexts.Furthermore, adapting and validating the English version of the Sustainable Environmental Education Self-Efficacy Scale (SEESES) in different cultural contexts would facilitate cross-cultural comparisons andenrich the current understanding of sustainable environmental education.

Second, future validation efforts should examine the consistency of the proposed factor structure across independent samples drawn from various geographical regions and educational settings to strengthen evidence regarding the external validity of the instrument.

Third, the present study focused exclusively on students perceived self-efficacy. Future investigations may examine the relationship between environmental self-efficacy and actual environmentally responsible behaviors through mixed-method or longitudinal research designs.

Finally, subsequent research could examine the predictive validity of SEESESby investigating its relationships with environmental knowledge, environmental attitudes, pro-environmental behavior, environmental citizenship, and sustainability literacy. Longitudinal studies may also explore how environmental self-efficacy develops throughout students' educational experiences.

Ethical Approval:

This research was conducted following ethical approval issued by the Social Sciences Institute of XXX University (Decision No. 31906847/050.04.04.08/17, dated September 29, 2023), together with official research permission from the X Provincial Directorate of National Education (Approval No. 89504027).

Acknowledgement:

This study was derived from the first author's PhD dissertation, completed under the supervision of the second author.

References

1. ANH, D. N. (2026). Determinants of Competitiveness of Logistics Companies Across Ownership Types in Vietnam. Quality-Access to Success, 27(213), 23.
2. Akyüz, Y. (2015). Türk eğitim tarihi: M.Ö. 1000'den M.S. 2015'e. Ankara:Pegem Akademi Yayıncılık.
3. Alım, M. (2006). Avrupa Birliği üyelik sürecinde Türkiye'de çevre ve ilköğretimde çevre eğitimi, Kastamonu Eğitim Dergisi, 14(2), 599-616.
4. Asiye Dinçel, "Task-Based Language Teaching and Its Effect on Communicative Competence in ESL Learners", Insight: Journal of Educational Research and Innovation, vol. 1, no. 2, pp. 26–36, Sep. 2025.
5. Aydın, F. veÜnaldı, F. (2013). Coğrafya öğretmen adaylarının sürdürülebilir çevreye yönelik tutum-

ları. Kalem Eğitim ve İnsan Bilimleri Dergisi, 3(1), 11-42.
6. Ardoin, N. M., Bowers, A. W., & Gaillard, E. (2022). Does environmental education benefit environmental outcomes in children and adolescents? A meta-analysis. Journal of Environmental Psychology, 81, 101782. https://doi.org/10.1016/j.jenvp.2022.101782
7. Bandura, A. (1995). Exercise of personal and collective efficacy in changing societies. In A. Bandura (Ed.), Self-efficacy in changing societies (pp. 1–45). Cambridge University Press.
8. Bandura, A. (1997). Self-efficacy: The exercise of control. W. H. Freeman and Company.
9. Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), Self-efficacy beliefs of adolescents (Vol.5, pp. 307–337). Information Age Publishing.
10. Başaran Uğur, A. R., Bektaş, O. ve Güneri, E. (2019). Sınıf ve fen bilgisi öğretmen adaylarının sürdürülebilir çevre tutum düzeyleri. Uluslararası Sosyal Araştırmalar Dergisi, 12(63), 775-788.
11. Şaziye Kanyılmaz. (2025). Metacognitive Strategies in Technology-Enhanced Learning: Implications for Student Self-Regulated Learning. Fusion EDU: Journal of Education and Learning Sciences, 1(2), 20–27. Retrieved from https://fusionedu.org/home/index.php/JELS/article/view/9
12. Candaş, Z. ve Karataş, A. (2017). Türkiye'de 1996–2016 yılları arasında çevre eğitimi alanında yapılan çalışmaların içerik analizi. Fen Bilimleri Öğretimi Dergisi, 5(2), 143-159.
13. Cirit Gül, A., Tağrikulu, P., Çobanoğlu, İ. H. ve Çobanoğlu, E. O. (2022). Öğretmen adaylarının sürdürülebilir çevre eğitimine yönelik tutumlarının değerlendirilmesi. İnönü Üniversitesi Eğitim Fakültesi Dergisi, 23(1), 645-670
14. Çakır Sümer, G. (2007). Türkiye'de çevre alanyazını ve gelişme aşamaları (Doktora tezi). Yükseköğretim Kurulu Ulusal Tez Merkezi veri tabanından erişildi. (Tez No. 226963)
15. Çelikbaş, A. (2016). Sürdürülebilirliği temel alan çevre eğitiminin ortaokul öğrencilerinin çevresel davranışlarına ve sürdürülebilir çevre tutumlarına etkisi(Yüksek lisans tezi). Yükseköğretim Kurulu Ulusal Tez Merkezi veri tabanından erişildi. (Tez No. 439283)
16. Çetin, O. ve Yalçınkaya, E. (2018). Çevresel farkındalığına ilişkin bir ölçek geliştirme çalışması. Uluslararası Sosyal Bilimler Eğitimi Dergisi, 4(1), 14-26
17. Çokluk, Ö., Şekercioğlu, G. ve Büyüköztürk, Ş. (2018). Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları (Yedinci Baskı). Ankara:Pegem Akademi Yayıncılık.
18. DeVellis, R. F. (2016). Scale development: Theory and applications (4th edition). Sage publications.
19. Engin, H. (2010). Coğrafya eğitiminde sürdürülebilir kalkınma, sürdürülebilirlik eğitimi ve çevre eğitimi konularının kazandırılması(Yüksek lisans tezi). Yükseköğretim Kurulu Ulusal Tez Merkezi veri tabanından erişildi. (Tez No. 264124)
20. Eğitim Reformu Girişimi. (2024). Türkiye Yüzyılı Maarif Modeli'nin amacını anlamak. Eğitim Reformu Ağ Sitesi. 27 Ocak 2025 tarihinde https://www.egitimreformugirisimi.org/wp-content/uploads/2024/08/Turkiye-Yuzyili-Maarif-Modelinin-Amacini-Anlamak.pdf adresinden alınmıştır.
21. Çalişkan, E. (2026). Effects of Instructional Coding Strategies on Elementary and Middle-School Students' Computational Thinking. International Journal of Education Technology and Scientific Researches, 11(33), 41–57. https://doi.org/10.35826/ijetsar.798
22. Gıcır, B., Oruç, I. ve Özatlı, S. (2020). X, Y, Z kuşaklarının çevre davranış düzeylerinin farklı değişkenlere göre incelenmesi: Balıkesir örneği. Eğitim ve Toplum Araştırmaları Dergisi/JRES,7(2), 491-516.
23. Gönençgil, B. (2011). Uluslararası süreçler çerçevesinde çevre eğitimi. Ankara: Türkiye Çevre Vakfı Yayınları.
24. Grimm, N. B., Foster, D., Groffman, P., Grove, J. M., Hopkinson, C. S., Nadelhoffer, K. J., Pataki, D. E., & Peters, D. P. (2008). The changing landscape: ecosystem responses to urbanization and pollution across climatic and societal gradients. Frontiers in Ecology and the Environment, 6(5), 264-272
25. Guilford, J. P. (1954). Psychometric methods. New York, NY: McGraw-Hill.
26. Tarı, A., & Uzun, E. M. (2023). Okul öncesi öğretmenlerinin çevresel sürdürülebilirlik hakkındaki

görüşlerinin ve uygulamalarının incelenmesi. Milli Eğitim Dergisi, 52(240), 3139-3160.
27. Hinton, P. R., Brownlow, C., McMurray, I., & Cozens, B. (2004). SPSS explained. New York: Routledge.
28. AL-AZZAM, A. A., TANASH, H. A., ALKHASAWNEH, K. T. M., & ALBDOUR, A. W. M. (2026). Kaizen Strategy and competitive advantage: A case study of Jordanian banks. Quality-Access to Success, 27(213), 68.
29. Kahyaoğlu, M. (2016). Türkiye'de çevre eğitimi üzerine yapılan araştırmalar: bir içerik analizi çalışması. Marmara Coğrafya Dergisi,34, 50-60.
30. Kaiser, H. F. (1974). An index of factorial simplicity. Psychometrika, 39(1), 31-36. https://doi.org/10.1007/BF02291575
31. Karakaya, A. ve Kurtdede Fidan, N. (2023). Sınıf öğretmenlerinin hayat bilgisi dersinde sürdürülebilir çevre bilinci kazandırmaya yönelik görüşleri. Uluslararası Bilim ve Eğitim Dergisi, 6(2), 38-62.
32. Karakoyun, N. ve Uzun, N. (2022). 2011-2022 yılları arasında çevre eğitimi ile ilgili yayımlanan lisansüstü tezlerin incelenmesi. Ihlara Eğitim Araştırmaları Dergisi, 7(1), 51-65.
33. Karasar, N. (2012). Bilimsel araştırma yöntemi: Kavramlar, ilkeler, teknikler (37. baskı). Ankara: Nobel Akademik Yayıncılık.
34. Keleş, Ö., Uzun, N. ve Varnacıuzun, F. (2010). Öğretmen adaylarının çevre bilinci, çevresel tutum, düşünce ve davranışlarının doğa eğitimi projesine bağlı değişiminin değerlendirilmesi. Elektronik Sosyal Bilimler Dergisi, 9(32), 384-401.
35. Kılıç, Ç. ve Kan, A. (2020). Çevre sorunlarına yönelik tutum ölçeği geliştirme çalışması. Bolu Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 20(4), 1676-1690. https://dx.doi.org/10.17240/aibuefd.2020.20.58249-540945
36. Lord, F.M., &Novick, M.R. (1968). Statistical Theories of Mental Test Scores. New Jersey: Addison-Wesley Pub.Co.
37. Madran, E. (1996). Cumhuriyetin ilk otuz yılında (1920-1950) koruma alanının örgütlenmesi. ODTÜ Mimarlık Fakültesi Dergisi, 16(1-2), 59-97.
38. Ministry of National Education. (2006). İlköğretim fen ve teknoloji dersi öğretim programı. Ankara.
39. Ministry of National Education. (2013). İlköğretim kurumları (ilkokul ve ortaokul) fen bilimleri dersi (3, 4, 5, 6, 7 ve 8. sınıflar) öğretim programı Ankara.
40. Ministry of National Education. (2017). Hayat bilgisi dersi öğretim programı (İlkokul 1, 2 ve 3. sınıflar). Ankara.
41. Ministry of National Education. (2018). Fen bilimleri dersi öğretim programı (İlkokul ve ortaokul 3, 4, 5, 6, 7 ve 8. sınıflar). Ankara.
42. Ministry of National Education. (2024). Türkiye Yüzyılı Maarif Modeli Öğretim Programları Ortak Metni. Ankara.
43. Ministry of Science, Industry and Technology. (2015). Ulusal geri dönüşüm stratejisi ve eylem planı 2014-2017. https://www.ahika.gov.tr/assets/upload/dosyalar/ulusal-geri-donusum-stratejisi-ve-eylem-plani-2014-2017pdf.pdf adresinden alınmıştır.
44. Mohamoud, A. S., Maon, S. N., & Kassim, E. S. (2020). Exploring critical success factors of education for sustainable development (ESD) in Malaysia. Journal of International Business, Economics and Entrepreneurship, 5(2), 62–72. https://doi.org/10.24191/jibe.v5i2.14237
45. Nunnally, J. (1978). Psychometric methods. New York: McGraw-Hill.
46. Olcay, H. ve Çukur, H. (2025). Yaşanılan yerdeki çevre sorunlarına yönelik farkındalık ölçeği'nin geliştirilmesi: Geçerlik ve güvenirlik çalışması. TEBD, 23(1), 522-540. https://doi.org/10.37217/tebd.1515382
47. Özdemir, O. (2007). Yeni bir çevre eğitimi perspektifi: Sürdürülebilir gelişme amaçlı eğitim. Eğitim ve Bilim, 32(145), 23-38.
48. Özdemir, A., Aydın, N. ve Vural, R. A. (2009). Çevre eğitimi öz-yeterlik algısı üzerine bir ölçek geliştirme çalışması. Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Dergisi, 26, 1-8.
49. Özgeçen Sağdıç, Ö. ve Şahin Ç. (2024). Sınıf eğitimi ve okul öncesi eğitimi öğretmen adaylarının çevre eğitimi tutumlarının incelenmesi. Ahi Evran Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 10(3), 964-980.
50. Özkan, B. (2017). Okul öncesi öğretmenlerinin okul öncesi çevre eğitimine yönelik görüşlerinin incelenmesi. Akademik Bağış Dergisi, 62, 80-87.
51. Özlü, G., Keskin, M. Ö. ve Gül, A. (2013). Çevre eğitimi öz-yeterlik ölçeği geliştirilmesi: geçerlik ve güvenirlik çalışması. Gazi Eğitim Fakültesi

Dergisi, 33(2), 393-410. https://izlik.org/JA54TR86NH
52. Özsoy, S. ve Ahi, B. (2014). İlkokul fen bilimleri dersi öğretim programında çevre eğitimi. Eğitim ve Bilim, 39(176), 123-135.
53. Öztürk, M. ve Orhan, A. (2024). Sınıf öğretmenlerinin çevre eğitimine yönelik görüşleri. Journal of Computer and Education Research, 12(24), 476-504.
54. Öztürk, T. ve Öztürk, F. Z. (2015). Öğretmen adaylarının çevre ve çevre eğitimi ile ilgili görüşleri: Ordu Üniversitesi örneği. Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 18(33), 115-132.
55. Suwantono, A., Ciptadi, G., Efani, A. Hidayati, B. (2026). Sustainable Innovation Model of Adiwiyata Vocational Schools Based on Green Budgeting: Building Environmentally Friendly Vocational Schools in Bojonegoro, Indonesia.Sciences of Conservation and Archaeology, Volume 38(1), 276-286. DOI: 10.48141/sci-arch-38.1.26.28
56. Sinakou, E., Donche, V., Pauw, J., &Petegem, P. (2019). Designing Powerful Learning Environments in Education for Sustainable Development: A Conceptual Framework. Sustainability, 11(21), 1-23. https://doi.org/10.3390/su11215994.
57. Şeren, N. ve Mert, H. (2020, Eylül). Yaşanabilir bir gelecek için çevresel sürdürülebilirlik: Öğretmen görüşlerine dayalı bir araştırma. VII. International Eurasian Educational Research Congress (EJER Congress 2020) bildiri kitabı içinde (s. 654-665). Eskişehir, Türkiye.
58. Şimşekli, Y. (2004). Çevre bilincinin geliştirilmesine yönelik çevre eğitimi etkinliklerine ilköğretim okullarının duyarlılığı.Uludağ Üniversitesi Eğitim Fakültesi Dergisi, 17(1), 83-92.
59. Tabachnick, B. G., &Fidell, L. S. (2013). Using multivariate statistics (Sixth edition). Boston: Allyn and Bacon.
60. Tavşancıl, E. (2006). Tutumların ölçülmesi ve SPSS ile veri analizi. Ankara: Nobel Yayın Dağıtım.
61. Türk Eğitim Derneği (2024). Türkiye Yüzyılı Maarif Modeli ortak metni üzerine değerlendirme. Türk Eğitim Derneği Ağ Sitesi. 29 Ocak 2025 tarihinde https://tedmem.org/storage/writes/May2024/jRig4W4mjT6skSOcRARS.pdf adresinden alınmıştır.
62. United Nations. (1972). United Nations Conference on the Human Environment (Stockholm Conference). Retrieved from https://sustainabledevelopment.un.org/milestones/humanenvironment
63. United Nations Educational, Scientific and Cultural Organization. (1984). Activities of the UNESCO-UNEP international environmental education programme (1975-l983). Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000059759
64. United Nations Educational, Scientific and Cultural Organization. (1987). Intergovernmental conference on environmental education Tbilisi. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000032763
65. United Nations Educational, Scientific and Cultural Organization. (2017). Education for sustainable development goals: Learning objectives. Paris: UNESCO Publishing.
66. Ünal, S. ve Dımışkı, E. (1999). Türkiye'de çevre eğitimi ve öğretmen eğitimi programları. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 16-17, 142-154.
67. Ünal, S., Mançuhan, E. ve Sayar, A. A. (2001). Çevre bilinci, bilgisi ve eğitimi. İstanbul: Marmara Üniversitesi Yayınları.
68. Walliman, N. (2006). Social research methods. London: SAGE Publications.
69. Yalçın, M. (2010). Köy enstitüleri ve çevre eğitimi. Eğitim ve Toplum, 34(1), 15-28.
70. Yıldız, K., Güzel Gürbüz, P., Esentaş, M., Beşikçi, T. ve Balıkçı, İ. (2021). Üniversite öğrencilerinin sürdürülebilir çevre eğitimi ve çevre sorunlarına yönelik tutumları arasındaki ilişkinin incelenmesi. Uluslararası Sosyal Alan Araştırmaları Dergisi, 10(1), 35-49.
71. Yücel, E. Ö. ve Özkan, M. (2014). Ortaokul öğrencilerine yönelik çevresel tutum ölçeği geliştirilmesi. Uludağ Üniversitesi Eğitim Fakültesi Dergisi, 27(1), 27-48. https://doi.org/10.19171/uuefd.37221

EK 1: SÜRDÜRÜLEBİLİR ÇEVRE EĞİTİMİ ÖZYETERLİK ALGI ÖLÇEĞİ

Sevgili Öğrenciler,

Doktora tez çalışmam kapsamında yürütmekte olduğum "Sürdürülebilir Çevre Eğitimi Özyeterlik Algı Ölçeği" çalışması için sizlerin düşüncelerine ihtiyaç duymaktayım. Aşağıda yer alan her maddeyi dikkatlice okuyunuz. Her bir madde için "Tamamen Katılıyorum", "Katılıyorum", "Kısmen Katılıyorum", "Katılmıyorum" veya "Kesinlikle Katılmıyorum" seçeneklerinden sadece bir kutucuğa "X" işareti koyunuz. Ölçekte toplam 28 madde yer almaktadır. Yaklaşık 20 dk. sürmektedir. Tüm ifadelere cevap vermeniz hazırlamış olduğum çalışmam için önemlidir. Bu çalışma için vereceğiniz cevaplar bilimsel amaçlı kullanılacaktır. Lütfen isminizi yazmayınız. Katkı sağladığınız ve zaman ayırdığınız için teşekkür ederim.

Kişisel Bilgiler

1. Cinsiyetiniz: Kız ( ) Erkek ( )

2. Doğum Yılınız: 20.....

3. Kardeş Sayısı: Tek çocuğum. ( ) 1 kardeşim var. ( )
2 kardeşim var. ( ) 3 ve daha fazla kardeşim var. ( )

4. Sivil Toplum Kuruluşlarının (TEMA gibi) çevre ile ilgili çalışmalarına katıldınız mı?
Evet ( ) Hayır ( )

5. Satın aldığınız ürünlerin çevreye zararlı olup olmadığını kontrol eder misiniz?
Evet ( ) Hayır ( )

6. Çevreyle ilgili bir projeye katıldınız mı?
Evet ( ) Hayır ( )

Madde Numaraları	Ölçeğin Boyutları	Maddeler	Tamamen Katılıyorum	Katılıyorum	Kısmen Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum
1	Duyarlılık	Sürdürülebilir çevre için arkadaşlarıma neler yapabileceklerine yönelik bilgilendirme yapabilirim.					
2		Çevremdeki arkadaşlarıma sürdürülebilir çevre eğitimleri ile iklim değişikliğinin önüne geçilebileceğine dair bilgilendirmeler yapabilirim.					
3		Sürdürülebilir çevre eğitiminde öğrendiklerimi diğer derslerle ilişkilendirebilirim.					
4		Sürdürülebilir çevre eğitimi ile çevre sorunlarına çözüm önerileri getirebilirim.					
5		Sürdürülebilir çevre için neler yapılabileceğini araştırırım.					
6		Sürdürülebilir çevre için yenilenebilir enerji kaynaklarının kullanılmasına yönelik çalışmaları araştırırım.					

Madde Numaraları	Ölçeğin Boyutları	Maddeler	Tamamen Katılıyorum	Katılıyorum	Kısmen Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum
7	Duyarlılık	Sürdürülebilir çevre için hava ve su kirliliğinin önüne geçilebilecek projeler hazırlayabilirim.					
8		Sürdürülebilir çevre eğitimleri ile iklim değişikliğinin önüne nasıl geçilebileceğini arkadaşlarıma anlatabilirim.					
9		Sürdürülebilir çevre ile ilgili kavramsal bilgileri öğrenebilirim.					
10		Yenilenebilir enerji kaynaklarının önemini arkadaşlarıma anlatabilirim.					
11		Sürdürülebilir çevre eğitimleri ile iklim değişikliğinin önüne geçilebileceğine yönelik projeler hazırlayabilirim.					
12	Sorumluluk	Günlük hayatla sürdürülebilir çevre eğitimini ilişkilendirebilirim.					
13		Yenilenebilir enerji kaynaklarının neler olduğunu bilirim.					
14		Ozon tabakası için zararlı gazların kullanılmaması gerektiğini bilirim.					
15		Akarsu kirliliğinin sürdürülebilir çevreye olan zararlarını bilirim.					
16		Sürdürülebilir çevre eğitimi ile dünyadaki çevresel sorunlara farklı bir açıdan bakabilirim.					
17		Sürdürülebilir çevre ile ilgili kavramsal bilgilere sahibim.					
18		Diğer dersler ile sürdürülebilir çevre eğitimiyle ilgili konular arasında bağ kurabilirim.					
19		Yeşil alanlar oluşturulması ile ilgili projeler yapabilirim.					
20	Atık Yönetimini Destekleme	Sürdürülebilir çevre için doğal kaynaklarımızı korumamız gerektiğini bilirim.					

Madde Numaraları	Ölçeğin Boyutları	Maddeler	Tamamen Katılıyorum	Katılıyorum	Kısmen Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum
21	Atık Yönetimini Destekleme	Sürdürülebilir çevre için geri dönüştürülebilen ürünleri tercih ederim.					
22		Diğer derslerde sürdürülebilir çevre eğitiminde öğrendiklerimi uygulayabilirim.					
23		Sürdürülebilir bir çevre için atıklarımızı ayrıştırmamız gerektiğini bilirim.					
24		Atıklarımı geri dönüşüm kutularına göre ayırabilirim.					
25		Su israfını önleyerek sürdürülebilir çevreye katkı sağlarım.					
26	Doğal Kaynakları Koruma	Tek kullanımlık araç ve gereçlerin çevreye zarar vermediğini bilirim.					
27		Su kirliliğinin sürdürülebilir çevreye hiçbir etkisinin olmayacağını bilirim.					
28		Doğal kaynaklarımızın her zaman var olacağını düşünürüm.					

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