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Education for Sustainability in Curriculum-Based Activities: A Study on the Attitudes and Activity Plans of In-Service and Preservice Teachers towards Environmental Sustainability Education

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ABSTRACT
This study aims to investigate the attitudes of teachers and pre-service teachers towards sustainable environmental education, as well as the activity plans they design in alignment with these attitudes. A mixed-methods research design was adopted, involving 61 in-service teachers and 91 pre-service teachers as participants. Quantitative data were collected through the Sustainable Environmental Education Attitude Scale (SEEAS), while qualitative insights were obtained from the analysis of participants' one-month science and nature activity plans. The findings reveal that although participants generally demonstrate positive attitudes towards sustainable environmental education, these attitudes are not consistently reflected in the content and structure of their activity plans. Moreover, female participants and those who actively follow environmental news exhibited significantly higher attitude scores. The lack of dedicated coursework on sustainable environmental education within teacher training programs in Türkiye highlights a gap in educators' content knowledge and pedagogical preparedness in this area. In light of these findings, it is recommended to increase the presence of sustainability-oriented educational activities in schools and to provide teachers with targeted in-service training opportunities. Additionally, expanding the availability of sustainability-focused courses within teacher education faculties and fostering partnerships between non-governmental organizations and universities for organizing awareness-raising initiatives are considered essential. These actions are expected to play a critical role in cultivating environmentally responsible future generations.

KEYWORDS
Teacher; teacher attitudes; activity plans; sustainability; environmental sustainability education.

INTRODUCTION

Throughout history, humans have consistently interacted with their surrounding environment. Numerous definitions have been proposed to conceptualize the notion of the environment, with varying emphases. According to Billington (2011), the environment is the habitat of gases, water, humans, and all living beings that sustain life on Earth. He posits that the environment comprises both biotic and abiotic elements. Similarly, the environment encompasses all the factors that enable the survival and development of living organisms, and that influence them physically, chemically, and biologically (Çanakçıoğlu, 2011). Ertekin (2011) defines the environment as the social, economic, and cultural context in which humans and other living beings interact. Another definition views the environment as a system composed of living and non-living components that support the continuation of life (Dağdemir, 2015). The Turkish Language Association (TDK, 2022) describes the environment as "the totality of natural, social, and cultural external factors that influence the development of life."

As these definitions indicate, the concept of the environment lies at the intersection of two inseparable entities: humans and nature. While humans are entirely dependent on nature for survival, nature can exist independently of human presence (Parlak, 2004). Throughout all stages of life, human beings have maintained direct or indirect interaction with the environment, benefiting from its resources and opportunities made available for human use (Kayan, 2018). Over time, this interaction evolved, and humanity developed different perspectives toward nature and the environment eventually seeking to dominate them. This struggle for dominance is believed to have commenced with the Industrial Revolution (Ertan, 2004). The revolution sparked a surge in industrial production, unplanned urbanization, shifting consumption patterns, and environmental degradation including air, water, and soil pollution, habitat loss, and the extinction of species. These developments marked the beginning of environmental problems and contributed to their intensification (Akyüz, 2005; Pandey & Kulshreshtha, 2012).

In today's world, the root causes of environmental problems include factors such as irregular population growth, income inequality, malnutrition, unplanned urbanization, improper land use, hazardous waste disposal, destruction of green spaces, traffic congestion, unconscious energy consumption, and global warming. At the core of these problems lies a common denominator: human beings themselves both as contributors to and as problem-solvers of environmental degradation (Türk & Erciş, 2017).

In order for humanity and all other living beings on Earth to maintain their existence and ensure the continuity of life for future generations, it is imperative that the environment is protected (Şengün, 2015). Considering that humans play a central role in both causing and resolving environmental issues, the formation of environmental awareness becomes essential (Gül, 2013). One of the most effective ways to instill environmental awareness and raise environmentally conscious individuals is through environmental education (Karakoç, 2004; Kavaz et al., 2021). Environmental education is not only a response to ecological crises but also

a transformative process that nurtures values, skills, and attitudes necessary for sustainable living (Hungerford & Volk, 1980; Albion et al., 2025a).

Despite the well documented global significance of environmental education, there remains a critical research gap: while numerous studies address the importance of education in shaping environmental awareness (Kayıran, 2025; Pramling Samuelsson & Park, 2017), relatively fewer studies examine how teachers' personal attitudes toward sustainability are reflected in their pedagogical practices and planned activities. This gap is particularly pronounced in the context of comparing preservice and in-service teachers, whose perspectives may differ depending on professional experience and exposure to sustainability discourses (Altaf & Tufail, 2024).

Moreover, education represents a vital stage for cultivating sustainable habits, as children are especially receptive to learning from role models such as teachers (Kayıran & Bağçeci, 2025; Demir & Yalçın, 2014). Therefore, the role of teachers both preservice and in-service in designing and implementing sustainability-oriented activity plans cannot be overstated. By explicitly linking education with teacher practices, this study aims to contribute to the ongoing dialogue on how environmental education can be effectively translated into classroom realities (Albion et al., 2025b; Malone & Tranter, 2003).

LITERATURE REVIEW

Environmental education has long been recognized as an essential component of sustainable development. The early frameworks established by UNESCO and UNEP in the 1970s emphasized not only awareness but also action-oriented approaches to address environmental issues (Hungerford & Volk, 1980). Since then, research has consistently highlighted the role of education in shaping environmentally responsible citizens (Karataş, 2018).

Recent studies have underscored that the effectiveness of environmental education largely depends on the attitudes, knowledge, and pedagogical practices of teachers, who act as mediators between global sustainability goals and classroom realities (Albion et al., 2025b). Teachers' values and attitudes strongly influence whether sustainability principles are embedded into daily instruction and activity design (Smith, 2009; Ünal, 2011).

In early education, the integration of sustainability is particularly important because this period marks a critical developmental stage when lifelong habits and attitudes begin to form (Pramling Samuelsson & Park, 2017). Scholars argue that children in early learning environments are highly receptive to experiential and play-based methods that connect them to nature, making teachers' sustainability perspectives pivotal in shaping eco-conscious dispositions (Altaf & Tufail, 2024).

Several international initiatives, including eco-schools, green schools, and forest school programs, have been introduced to institutionalize sustainability practices in education. These initiatives demonstrate that when teachers are both knowledgeable and committed, children develop not only cognitive understanding but also affective and behavioral dispositions toward

environmental responsibility (Auer, 2008; Kensler & Uline, 2016). Yet, research also shows a gap between teachers' stated attitudes and their actual implementation of sustainability-oriented practices in classrooms (Cavas, 2024).

Comparative research has drawn attention to the differences between preservice and in-service teachers. While preservice teachers often show high levels of enthusiasm for sustainability, they may lack the pedagogical confidence or institutional support to design effective activity plans (Malone & Tranter, 2003). In contrast, in-service teachers may demonstrate more practical knowledge but sometimes resist innovation due to entrenched routines or limited professional development opportunities (Albion et al., 2025b). This highlights the importance of investigating how both groups' attitudes translate into practice and whether these practices align with broader sustainability goals.

Furthermore, the literature indicates that educators face unique challenges in embedding sustainability into curricula, including limited resources, insufficient training, and curricular constraints (Altaf & Tufail, 2024; Cavas, 2024). These challenges underscore the need for empirical studies that examine not only teacher attitudes but also the extent to which these attitudes are reflected in concrete activity plans for learners.

Thus, this study builds on previous scholarship by explicitly addressing the alignment between teachers' attitudes toward sustainable environmental education and the pedagogical activities they design. By doing so, it contributes to filling a critical gap in the literature that has often remained implicit rather than explicitly examined.

Research Purpose and Questions

In this context, the purpose of the present study is to examine the attitudes of in-service and preservice teachers toward sustainable environmental education, as well as the activity plans they develop in this regard. Based on the findings, the study aims to determine whether there is consistency between their attitudes and their activity plans. Evaluating both the attitudes and the activity plans of teachers and teacher candidates is considered important in terms of revealing the current situation and the level of coherence between the two.

It is expected that the study will identify the general approaches teachers and teacher candidates take toward sustainable environmental education by examining their attitudes and the activities they design. Moreover, the findings may help participants critically reflect on their current practices and make adjustments if needed.

The main research question of the study is:

"Do the attitudes of in-service and preservice teachers toward sustainable environmental education align with the instructional activities they implement?"

To address this main research question, the following sub-questions were formulated:

1. What are the levels of in-service and preservice teachers' attitudes toward sustainable environmental education?
2. Do these attitudes differ significantly by gender?

3. Do the attitudes of in-service and preservice teachers toward sustainable environmental education differ significantly between the two groups?
4. Do the attitudes differ significantly depending on whether the participants are members of an environmental organization?
5. Do the attitudes vary significantly according to the participants' interest in environmental news?
6. To what extent do the one-month activity plans of in-service and preservice teachers include activities related to sustainable environmental education?
7. Is there a consistency between the participants' attitudes toward sustainable environmental education and the activities they plan and implement?

METHOD

In order to examine the attitudes of teachers and preservice teachers toward sustainable environmental education and the activity plans they prepare in this context, a mixed methods research design was employed, integrating both quantitative and qualitative data. Specifically, the exploratory sequential design, one of the mixed methods designs, was utilized in this study. In this design, quantitative data are collected and analyzed first; based on the results, subgroups for qualitative data collection are identified and qualitative data collection is subsequently conducted. In this model, data collection is not conducted simultaneously; however, both types of data are given equal importance (Creswell & Clark, 2018).

The mixed methods approach was chosen to allow for both breadth and depth in understanding: quantitative data provided generalizable patterns of teacher and preservice teacher attitudes, while qualitative analysis offered insights into how these attitudes were reflected in practice through activity plans.

Population and Sample

The study population consisted of teachers working in the Onikişubat district of Kahramanmaraş, Türkiye, during the 2022–2023 academic year, as well as preservice teachers enrolled at the Faculty of Education at Kahramanmaraş Sütçü İmam University (KSU).

The participants were selected through convenience sampling, a non-probability sampling method that involves selecting participants who are easily accessible to the researcher.

In the qualitative dimension of the research, 46 participants were selected from the group of teachers who also participated in the quantitative phase, using criterion sampling, one of the purposive sampling methods.

The qualitative study group was formed based on two main criteria:

1. Participants' scores at different levels on the Attitude Scale Toward Education for Sustainable Environment, and
2. Voluntary participation in the qualitative phase of the research.

Accordingly, the qualitative study group consisted of 10 in-service teachers and 10 preservice teachers who obtained varied scores from the scale.

Demographic characteristics of the participants are presented in Table 1.

Table 1.

Demographic Information of the Participants

Variable	n	%
Gender	Female 122	80.3
	Male 30	19.7
Occupation	Teacher 61	40.1
	Student 91	59.9
Membership in Environmental Organization	Yes 8	5.3
	No 144	94.7
Interest in Environmental News	Yes 100	66.8
	No 52	34.2

Data Collection Tools

Three data collection tools were used in the study. The tools employed to answer the sub-problems of the research are presented in Table 2.

Table 2.

Data collection tools used to address the sub-problems of the research

Sub-problem	Data collection tool
What is the level of attitudes of teachers and preservice teachers toward education for sustainable environment?	Attitude Scale Toward Education for Sustainable Environment
Do the attitudes significantly differ by gender?	Attitude Scale Toward Education for Sustainable Environment
Do the attitudes differ statistically between teachers and preservice teachers?	Attitude Scale Toward Education for Sustainable Environment
Do the attitudes differ depending on membership in an environmental organization?	Attitude Scale Toward Education for Sustainable Environment
Do the attitudes differ depending on interest in environmental news?	Attitude Scale Toward Education for Sustainable Environment
What is the status of teachers' and preservice teachers' one-month activity plans in terms of including sustainable environment activities?	One-Month Science and Nature Activity Plans
Do the attitudes align with the activities implemented?	Attitude Scale Toward Education for Sustainable Environment; One-Month Science and Nature Activity Plans

Attitude Scale Toward Education for Sustainable Environment

In this study, the *Attitude Scale Toward Education for Sustainable Environment* developed by Afacan and Demirci Güler (2011) was used. The scale consists of 44 items (33 positive and 11 negative) and was administered to teachers and preservice teachers in two sessions. It is based on a 5-point Likert-type structure. During the development of the scale, the Cronbach's alpha reliability coefficient was found to be 0.92, indicating a high level of reliability. Kaiser classifies values above 0.90 as excellent; therefore, this attitude scale is considered to be highly reliable and close to excellent (Afacan & Demirci Güler, 2011).

Science and Nature Activity Plans

To examine the practical dimension of sustainability, in-service teachers' existing one-month science and nature activity plans were collected, while preservice teachers were asked to design and submit one-month activity plans as part of the study. These plans were then evaluated by two independent field experts using document analysis.

The evaluation focused on: (a) the presence of sustainability-related objectives, (b) the integration of environmental concepts into daily activities, (c) the use of experiential and child-centered approaches, and (d) the extent to which the plans encouraged pro-environmental attitudes and behaviors. Inter-rater reliability for the evaluations was calculated, with a coefficient of 0.89, indicating strong agreement (Miles & Huberman, 1994).

Data Analysis

Quantitative data were analyzed using the SPSS 25 software package. Normality of distribution was tested using the Kolmogorov-Smirnov test, as the sample size exceeded 50. The results indicated normal distribution, and independent samples t-tests were conducted.

Qualitative data obtained from the lesson plans were analyzed using the document analysis technique. Validity was ensured by adhering to established qualitative procedures (Yıldırım & Şimşek, 2016). Reliability was further tested through inter-rater agreement, with a coefficient of 0.89, which is considered acceptable for qualitative research (Miles & Huberman, 1994).

Limitations

This study has several limitations. First, participants were selected through convenience sampling, which may limit the generalizability of the findings. Second, no information was collected on the subject areas or grade levels taught by in-service teachers, which restricts the ability to analyze variations across teaching contexts. Third, the study relied on self-reported data in the quantitative phase, which may be subject to social desirability bias. Finally, the activity plans analyzed represent a relatively short timeframe (one month), which may not capture the full scope of teachers' sustainability practices.

Ethical Considerations

Ethical approval for this study was obtained from the Ethics Committee of Kahramanmaraş Sütçü İmam University. Participation was voluntary, and informed consent was secured from all participants. Data were anonymized to protect confidentiality. All procedures were conducted

in accordance with the ethical standards of the Declaration of Helsinki (World Medical Association, 2013).

FINDINGS

This section presents the interpretation of the findings obtained from the research questions. The first sub-question of the study is: What is the level of attitudes of teachers and teacher candidates toward sustainable environmental education? Descriptive statistics conducted to reveal this situation are presented in Table 3.

Table 3.

Descriptive Statistics Results of the Sustainable Environmental Education Attitude Scale (SEEAS)

Scale	n	Mean($\overline{x}$)	Standart Dev.	Ranj	Minimum and Maximum Values
SEEAS (total)	152	176,93	18,20	89	131-220

As seen in Table 3, the arithmetic mean of the total scores on the Sustainable Environmental Education Attitude Scale (SEEAS) for teachers and teacher candidates was calculated as 176.93. Since the scale uses a 5-point Likert format, score intervals were also determined to facilitate interpretation of the mean scores. According to these intervals, the mean value ($\overline{x}$ = 176.93) falls within the "Agree" range. Based on this result, it can be generally stated that teachers and teacher candidates have a high level of positive attitude toward environmental education.

The second sub-problem of the study is: Do the attitudes of teachers and teacher candidates toward sustainable environmental education differ statistically significantly according to gender? To address this sub-question, an independent samples t-test was conducted on the total mean scores. The findings are presented in Table 4 below.

Table 4.

t-Test Results for Sustainable Environmental Education Attitude Scores by Gender Variable

Variable		n	$\overline{x}$	SD	df	t value	p
Gender	Female	122	177,13	17,95	150	**,268**	**.789**
	Male	30	176,13	19,47			

***p<0.05**

As seen in Table 4, there is no significant difference in the attitudes of teachers and teacher candidates towards environmental education based on gender ($t < 2$ and $p > .05$). When the arithmetic means are examined, it is observed that female participants have a higher mean score compared to male participants.

The third sub-question of the study is: Do the attitudes of teachers and teacher candidates towards sustainable environmental education differ statistically significantly?

Table 5.

t-test Results for Sustainable Environmental Education Attitude Scores by Profession

Value		n	$\bar{x}$	SD	df	t value	P value
Occupation	Teacher	61	177,93	9,00	150	**,240**	**.807**
	Student	91	176,26	17,70			

***p<0.05**

As shown in Table 5, there is no statistically significant difference in the attitudes toward sustainable environmental education between teachers and teacher candidates ($t < 2$, $p > .05$). When examining the arithmetic means, it is observed that teacher participants have slightly higher mean scores compared to teacher candidate participants.

The fourth sub-question of the study is: "Do the attitudes of teachers and teacher candidates toward sustainable environmental education significantly differ based on membership in environmental organizations?" To address this sub-question, an independent samples t-test was conducted on the total mean scores. The findings are presented in Table 6 below.

Table 6.

Results of the t-Test for Attitude Scores toward Sustainable Environmental Education by Membership in Environmental Organizations

Variable		n	$\bar{x}$	SD	df	t value	p
Membership in Environmental Organization	Yes	8	175,12	20,30	150	**-,280**	**.681**
	No	144	177,03	18,14			

As shown in Table 6, there is no significant difference in the attitudes toward sustainable environmental education between teachers and teacher candidates based on whether they are members of an environmental organization or not ($t < 2$ and $p > .05$).

Table 7.

t-Test Results of Sustainable Environmental Education Attitude Scores According to Interest in Environmental News

Variable		n	$\bar{x}$	SD	df	t value	p
Interest in Environmental News	Yes	100	180,04	17,24	150	**2,994**	**.923**
	No	52	170,96	18,66			

***p<0.05**

The fifth sub-question of the study is: Do the attitudes of teachers and teacher candidates toward sustainable environmental education significantly differ according to their interest in environmental news? To address this sub-question, an independent samples t-test was conducted on the mean total scores. The results are presented in Table 7 above.

As seen in Table 7, there is no statistically significant difference in the attitudes of teachers and teacher candidates toward sustainable environmental education based on their interest in environmental news ($t < 2$, $*p* > .05$).

The sixth sub-question of the study is: "What is the status of the inclusion of sustainable environmental education activities in the one-month activity plans of teachers and teacher candidates?" The findings obtained in response to this question are presented in Table 8 below.

Table 8

Distribution of Sustainable Environmental Activities in Science and Nature Activity Plans

Sustainable Environmental Activities in Science and Nature Curriculum	**Teachers**		**Tecaher Candidates**	
	n	%	n	%
Activities focused on keeping the environment clean	1	10	3	30
Integrating current environmental issues into classroom activities	0	0	1	10
Participation in environmental protection activities	0	20	1	10
Inclusion of recycled materials in classroom activities	2	20	6	60
Activities drawing attention to food and beverage waste	2	30	3	20
Activities highlighting causes of environmental pollution	1	10	7	70

As shown in Table 8, the one-month science and nature activity plans prepared by teachers and teacher candidates were examined, and the distribution of sustainable environmental activities within these plans was presented. According to the table, one teacher participant (n=1) included an activity related to keeping the environment clean in their plan. Among the teacher candidates, three participants (n=3) included such activities.

When examining activities aimed at integrating current environmental issues into the classroom, none of the teacher participants provided such an example, while one teacher candidate (n=1) incorporated an activity addressing this. Regarding classroom activities involving participation in environmental protection initiatives, no teacher participants included such activities, whereas only one teacher candidate (n=1) did.

Activities focused on recycling, which play a significant role in protecting the environment and promoting sustainability, were included by only two teacher participants (n=2) and six teacher candidates (n=6). In terms of activities addressing food and beverage waste—

an important issue in ensuring a sustainable world and environment—two teacher participants (n=2) and three teacher candidates (n=3) included such activities in their plans.

When examining activities designed to raise awareness among students about behaviors that pollute the environment and to foster environmentally responsible attitudes among future generations, it was observed that only one teacher participant (n=1) and seven teacher candidates (n=7) included such activities aimed at developing positive attitudes toward the environment.

The seventh sub-question of the study is as follows: Do the attitudes of teachers and teacher candidates toward sustainable environmental education align with the activities they plan? In order to answer this research question, participants' scores from the attitude scale were compared with the number of sustainable environmental activities included in their one-month activity plans. The findings are presented in Table 9 below.

Table 9.

Comparison Between Attitude Scores Toward Sustainable Environmental Education and the Frequency of Sustainable Environment-Oriented Activities in Participants' Plans

Participiants	Attitude Scale Scores	Number of Sustainable Environmental Activities
T1	220	2
T2	215	1
T3	194	1
T4	190	0
T5	184	1
T6	170	0
T7	160	0
T8	147	0
T9	140	1
T10	131	1
TC1	220	4
TC2	188	2
TC3	174	1
TC4	115	2
TC5	112	4
TC6	101	1
TC7	95	1
TC8	84	3
TC9	75	2
TC10	56	1

As shown in Table 9, the participants' scores obtained from the attitude scale and the number of sustainable environment-oriented activities included in their one-month activity plans are presented. According to the table, the teacher participant with the highest score on the scale included only two activities in their monthly plan. Notably, it is observed that teacher participants who scored high on the scale did not adequately include sustainable environmental

activities in their monthly science and nature activity plans. This indicates a lack of alignment between the scale scores and the implemented activities among teacher participants. When examining the scores and activity plans of the pre-service teacher participants, it is seen that the pre-service teacher with the highest score on the scale included four activities related to sustainable environment in their one-month activity plan. On the other hand, some pre-service teachers with relatively low scores on the scale included several sustainable environmental activities in their monthly science and nature activity plans. Similar to the teachers, this finding reveals that the scale scores of pre-service teachers do not align with their activity plans.

DISCUSSION

The findings of this study reaffirm the critical role of education in fostering sustainability-oriented attitudes and practices among teachers and pre-service teachers. Consistent with prior literature, participants expressed generally positive attitudes toward sustainable environmental education (SEE). However, the analysis revealed a weak correspondence between these attitudes and the integration of sustainability-focused activities in their instructional planning. This gap underscores the persistent challenge of translating favorable attitudes into concrete pedagogical practice, a pattern observed in other contexts as well (Albion et al., 2025b; Hill & Dyment, 2016).

Several factors may account for this inconsistency. Curricular constraints and overloaded program requirements often leave limited room for sustainability-focused content (Mills & Tomas, 2020). Inadequate access to resources, including age-appropriate teaching materials and training opportunities, may further hinder teachers' ability to embed sustainability principles in classroom activities (Dyment, Hill, & Emery, 2015). In addition, teachers' self-efficacy and beliefs regarding the feasibility of teaching sustainability topics may act as dispositional barriers (Ertmer, 1999; Brantley-Dias & Ertmer, 2013). These findings suggest that while awareness and positive attitudes are present, systemic and institutional challenges constrain implementation.

Gender differences observed in this study, with women showing higher attitude scores, align with research indicating that women tend to express greater sensitivity toward environmental issues (Tikka, Kuitunen, & Tynys, 2000). Similarly, participants engaged with environmental organizations or news media reported stronger pro-sustainability attitudes, reinforcing the role of external social and informational networks in shaping awareness (Cirit-Gül et al., 2022). Nevertheless, these positive dispositions were not consistently translated into practice, echoing earlier studies documenting a persistent disconnect between belief and enactment in sustainability education (Effeney & Davis, 2013; Albion et al., 2025b).

The limited inclusion of sustainability-oriented activities in lesson plans highlights the need for structured institutional support. Prior research emphasizes that targeted professional development, curriculum integration, and the provision of exemplar activities can enhance teachers' confidence and competence in sustainability education (Ferreira et al., 2019; Lekhu,

2023; Mahlomaholo, Israel & Mahlomaholo, 2023; Tarman & Dev, 2018; Yli-Panula et al., 2020). In particular, partnerships between teacher education programs and non-governmental organizations may provide authentic, practice-oriented opportunities for engaging with sustainability (Karademir, Uludağ, & Cingi, 2017).

This study is not without limitations. First, the reliance on self-reported scales and activity plans may not fully capture participants' actual classroom practices. Second, the sample size, while sufficient for the analyses performed, limits the generalizability of findings to broader populations. Third, qualitative data such as interviews or classroom observations could have offered deeper insights into the contextual and dispositional barriers preventing teachers from enacting their pro-sustainability attitudes. Future research should therefore combine quantitative and qualitative approaches to more fully explore these dynamics and to identify strategies that can bridge the attitude–practice gap.

In conclusion, while teachers and pre-service teachers demonstrate strong pro-environmental attitudes, these attitudes are not yet consistently operationalized in their teaching practice. Addressing this gap requires systemic interventions, including curriculum redesign, sustained professional development, and access to pedagogical resources. Such initiatives are essential to empower educators as agents of change and to ensure that the next generation develops the competencies needed for a sustainable future.

Practical Implications

The results of this study suggest that teacher education programs should move beyond fostering awareness and actively support the translation of pro-environmental attitudes into classroom practice. Preservice teacher training could integrate applied modules on sustainability pedagogy, including project-based learning, micro-teaching, and cross-disciplinary integration.

In-service teachers may benefit from targeted professional development that provides not only theoretical grounding but also practical strategies and ready-to-use materials for integrating sustainability into their teaching. Providing curricular flexibility and institutional incentives such as recognition programs or reduced workload for teachers implementing sustainability activities may also enhance engagement.

Partnerships between schools, universities, and non-governmental organizations (NGOs) can further strengthen sustainability education by offering authentic projects, teacher resources, and opportunities for collaboration. Such initiatives ensure that sustainability is not treated as an optional add-on but embedded across the curriculum as a transversal competence.

Future Research Directions

While this study contributes to understanding the gap between attitudes and practices, further research is necessary to explore this issue in greater depth. Comparative studies across regions and education systems could reveal how cultural and policy contexts influence teachers' ability to act on their pro-environmental attitudes.

Future research could employ longitudinal designs to trace how preservice teachers' sustainability attitudes evolve as they transition into professional roles. Intervention studies testing the impact of professional development programs or curricular reforms on teachers' practices would also provide actionable insights. Additionally, mixed-methods designs combining attitude scales, interviews, and classroom observations could more fully capture the dynamics of implementation and identify the most significant barriers.

Finally, examining children's responses to sustainability-focused activities may provide evidence of long-term impacts, offering a more holistic view of how teachers' practices shape students' environmental literacy and pro-environmental behavior.

CONCLUSION

This study demonstrates that while teachers and pre-service teachers in Türkiye generally hold strong pro-environmental attitudes, these positive dispositions are not consistently reflected in their instructional practices, as evidenced by the limited integration of sustainability-related activities in their science and nature lesson plans. Gender and engagement with environmental news or organizations emerged as important factors associated with higher attitude scores, yet these influences did not necessarily translate into practice, reinforcing the well-documented attitude–practice gap in sustainability education (Albion et al., 2025b; Effeney & Davis, 2013). The findings suggest that systemic barriers including curriculum constraints, resource limitations, and insufficient training continue to hinder the enactment of sustainability principles in classroom settings (Dyment et al., 2015; Mills & Tomas, 2020). Addressing these challenges requires embedding sustainability more deeply within teacher education curricula, expanding targeted professional development opportunities, and fostering partnerships with non-governmental organizations to provide authentic pedagogical resources. By closing the gap between awareness and practice, educators can be empowered as agents of change, thereby ensuring that future generations develop the knowledge, skills, and values necessary to meet the demands of a sustainable society.

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