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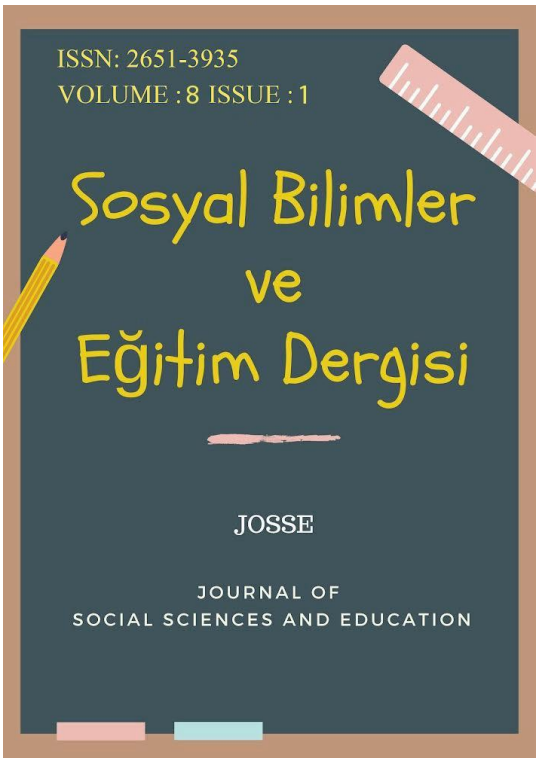

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Environmental Justice Education: Awareness or Transformation in Classrooms? A Systematic Review

***** *This study was presented as an oral presentation at the 1. International Black Sea Educational Sciences Congress in Trabzon on May 2-4, 2025.*

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Abstract

The escalating environmental crisis has underscored the urgent need for a paradigm shift in environmental education (EE), particularly toward models that integrate environmental justice (EJ) and foster critical engagement. This systematic review examines whether classroom-based EE interventions between January 2010 and February 2025 have primarily cultivated awareness or catalyzed transformative learning rooted in justice. Using the PRISMA methodology, 49 peer-reviewed articles were analyzed, encompassing interventions across early childhood education, primary school settings, and pre-service teacher training programs. Four core dimensions were evaluated: thematic content, pedagogical depth, student engagement, and instructional resources. Findings reveal a persistent emphasis on ecological content transmission, with limited incorporation of social or distributive justice themes. Most interventions promoted individual behavior change rather than collective, critically informed action. Student tasks often lacked depth, prioritizing information recall over participatory inquiry or civic engagement. Additionally, the widespread use of teacher-generated materials, while creative, seldom reflected interdisciplinary or socio-political complexities of EJ. This trend signals a missed opportunity to empower learners as agents of systemic change. The review concludes that although awareness of environmental issues is growing in educational contexts, the integration of environmental justice remains marginal and superficial.

Research Article

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Keywords: Environmental justice, environmental education, transformative learning, critical pedagogy, teacher education

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Introduction

The environmental crisis is no longer a looming threat—it is an undeniable reality shaped by decades of unsustainable practices (Carson, 1962). Accelerated climate change, biodiversity loss, and the inequitable distribution of natural resources such as food and water are consequences of societal models that prioritize economic growth over ecological balance (Wolff et al., 2017; Almond et al., 2020). In response to this escalating situation, a variety of global strategies have emerged to mitigate anthropogenic impacts, spanning social, economic, and health-related dimensions (Hofman-Bergholm, 2018).

Since the 1972 Stockholm Conference, education has been identified as a key driver for environmental action. Environmental education (EE), as first defined by Stapp et al. (1969), was envisioned as a tool to empower individuals with the knowledge, motivation, and skills needed to address environmental issues. UNESCO and other international bodies have since underscored the importance of nurturing sustainable values from early childhood (UNESCO, 2017). Yet, despite such theoretical advancements, practical classroom implementations remain scarce and often fail to foster transformative change (Olsson & Gericke, 2016; Liefländer & Bogner, 2014).

One of the main criticisms leveled at EE is its overreliance on knowledge transmission, rather than fostering meaningful behavioral change (Mogensen & Mayer, 2009). Fear-based narratives and top-down instruction models have discouraged students, particularly adolescents, from engaging in sustainability-oriented behaviors (Bartlett et al., 2022). Moreover, research has traditionally prioritized ecological literacy while sidelining crucial dimensions such as social equity, economic justice, and ethical responsibility (Dawson & Carson, 2020).

A growing body of literature argues that environmental issues are deeply entwined with justice and equity. The environmental justice (EJ) framework highlights how marginalized populations often bear the brunt of environmental degradation while contributing the least to its causes (Lele, 2017; Agyeman, 2014; Tsuji, 2021). From forced climate migration to disproportionate exposure to pollution, EJ brings to light the systemic inequities embedded in environmental challenges and the policy responses to them.

In educational contexts, integrating EJ within EE can empower students to act as agents of change (Dimick, 2012; Walter et al., 2020). Though not explicitly mentioned in the 2030 Agenda's Sustainable Development Goals (Menton et al., 2020), EJ aligns closely with the vision of participatory, critical, and emancipatory education (Sjöström & Eilks, 2018; Valladares, 2021). However, for EJ to become actionable in classrooms, pedagogical

approaches must go beyond content knowledge to foster systems thinking, critical literacy, and action competence (Lorenzo-Rial et al., 2020; Bächtold et al., 2022).

Despite emerging models, such as the use of argumentation, modelling, and future-oriented thinking in science education (Uskola & Puig, 2023; Esquivel-Martín et al., 2023; Brocos & Jiménez-Aleixandre, 2022), comprehensive frameworks for implementing EJ in everyday classroom instruction remain limited (Moore, 2023). While systematic reviews exist regarding EE interventions across education levels (Varela-Losada et al., 2016; Ardoin & Bowers, 2020; Güler Yıldız et al., 2021; O'Flaherty & Liddy, 2018), few if any address the integration of EJ, especially through a lens of transformative pedagogy.

Given this significant gap, the present systematic review aims to explore how environmental justice is addressed within formal education, particularly in early childhood education (ECE), primary education (PE), and pre-service teacher training (PTT). By focusing on classroom-based interventions, this study seeks to understand how EJ principles are (or are not) incorporated into teaching practices and what pedagogical elements are necessary to bridge the theory-practice divide.

Method

This study employed a quantitative, exploratory-descriptive design based on a systematic literature review approach. The objective was to investigate the extent to which environmental justice (EJ) is integrated into classroom-based environmental education (EE) practices within early childhood education (ECE), primary education (PE), and pre-service teacher training (PTT). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 framework was adopted to ensure transparency, reproducibility, and academic rigor in the review process (Page et al., 2021).

Model

This study adopted a quantitative research approach with an exploratory-descriptive methodology, conducted through a systematic literature review. Systematic reviews are particularly valuable for mapping existing knowledge, identifying patterns, and detecting gaps in research (Page et al., 2021). The aim was to assess how environmental education (EE) practices have integrated the environmental justice (EJ) perspective in early childhood education (ECE), primary education (PE), and pre-service teacher training (PTT). The review

followed the PRISMA 2020 guidelines for transparency and reproducibility (Page et al., 2021). The process is illustrated in Figure 1.

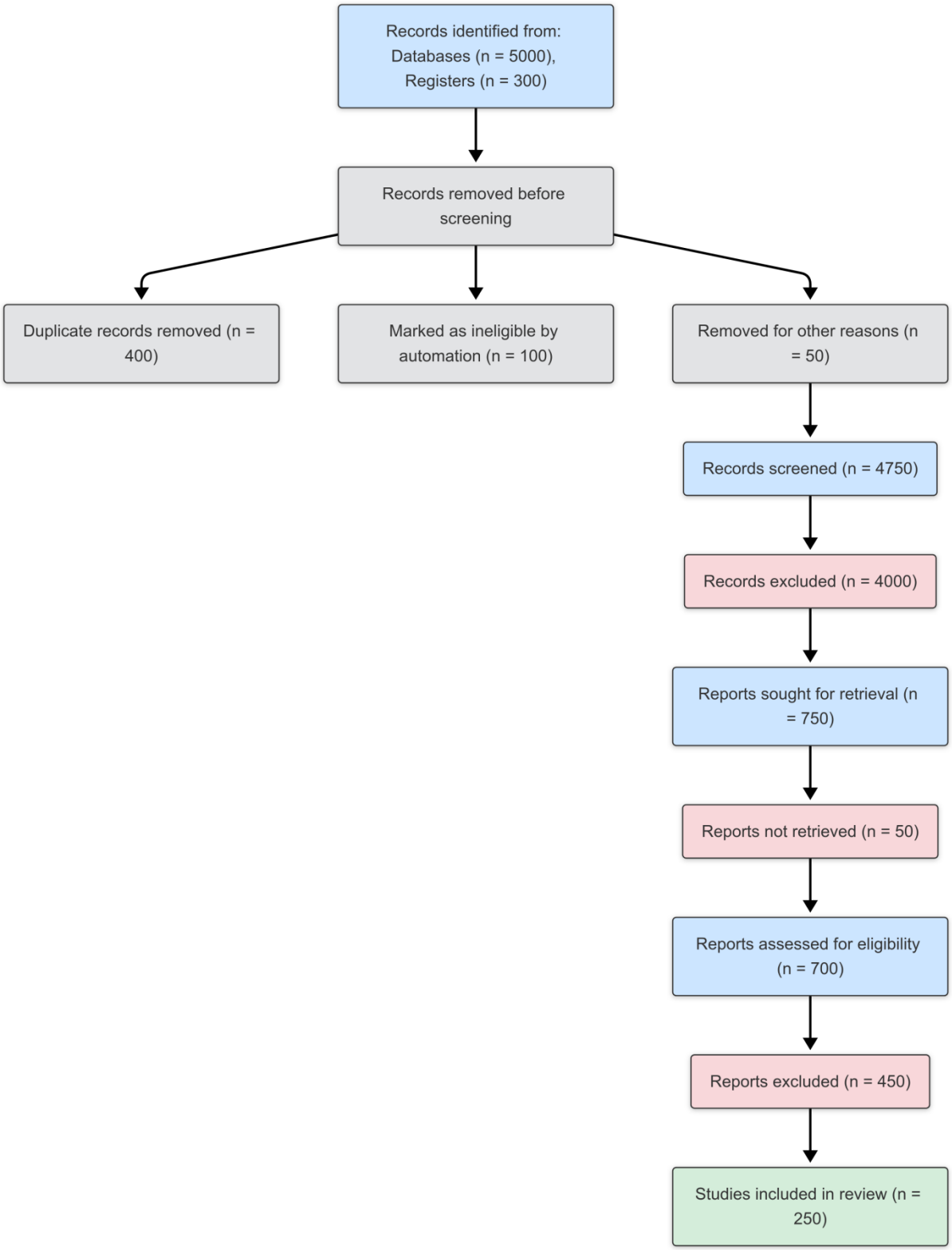

Figure 1 *PRISMA 2020 Flowchart – Systematic Review*

Data Sources and Sampling Criteria

A total of 22 high-impact journals indexed in JCR-SJR databases were selected across the fields of science education and social justice education, considering their academic influence and relevance in environmental education discourse. The articles were screened if they included the following keywords in English: "Environmental Education", "Environmental Justice", "Education for Sustainability", "Sustainable Development Goals", "Science, Technology, Society and Environment"

The timeframe was limited to January 2015 through December 2021 to align with the influence of the 2030 Agenda and the adoption of the SDGs, which emphasize environmental equity and social dimensions (UNESCO, 2017).

Selection Process

Articles were initially filtered for relevance and depth of intervention. In total, 88 interventions were identified: ECE (n = 8), PE (n = 45), and PTT (n = 35). These were evaluated based on whether they could be analysed in the context of EJ-oriented educational practices. Articles were classified as follows:

- Analysable: clear intervention details with EJ content
- Not analysable: relevant content but insufficient detail
- Not applicable: unrelated to environmental education despite matching keywords

As shown in Table 1, 49 articles were included for detailed analysis.

Table 1

Inclusion and Exclusion Criteria for Systematic Review

Type of Criterion	Inclusion	Exclusion
Environmental education topic	✓	
Published in JCR or SJR-indexed journal	✓	
Keywords in title/abstract	✓	
"Education for Sustainability"	✓	
"Sustainable Development Goals"	✓	
"Science, Technology, Society, Env."	✓	

Analytical Framework

The analysis grid included variables such as:

- Educational stage (ECE, PE, PTT)
- Content of intervention

- Level of depth (content knowledge, awareness-raising, action-taking)
- Student involvement
- Types of resources used

The classification of depth levels was guided by historical EE goals (Belgrade Charter, 1975; UNESCO, 2017):

- Content Knowledge: conceptual understanding
- Awareness-Raising: emotional and ethical engagement
- Action-Taking: initiatives led by students

These categories helped assess whether the interventions fostered transformative learning or remained limited to ecological knowledge (Medir et al., 2016).

Statistical Analysis

Two external evaluators validated the coding scheme. Then, both descriptive (absolute and relative frequencies) and inferential statistics (chi-square test, $p \leq .05$) were computed using IBM SPSS Statistics 19 and Microsoft Excel.

For example, Table 2 summarizes the observed frequencies of resources used across educational stages.

Table 2

Observed Frequencies of İnstructional Resources Used Across Educational Stages.

Resource Type	ECE	PE	PTT	Total	p-value
Self-made materials	6	12	8	26	.169
Other (misc.)	4	8	10	22	.104
Games/group dynamics	5	7	9	21	.045*
Field outings	1	12	7	20	.301
Images	6	6	4	16	.005*
Literary resources	5	4	0	9	.000*
Audiovisual materials	3	2	3	8	.078
Expert visits	1	4	3	8	.948
Total	33	59	49	141	

To ensure robustness, expected values were calculated (Table 3), based on row and column totals.

Table 3

Expected Frequencies of Instructional Resources Based on Educational Stage

Resource Type	ECE	PE	PTT
Self-made materials	6	11	9

Others	5	9	8
Games/group dynamics	5	9	7
Field outings	5	8	7
Images	4	7	6
Literary resources	2	4	3
Audiovisual materials	2	3	3
Expert visits	2	3	3

Ethical Considerations

The decision numbered 2025/04, dated 16/04/2025, was issued by the İstinye University Human Research Ethics Committee.

Findings

This section presents the findings of the systematic review across four key variables: contents, depth level, actions required of students, and resources. In each case, general patterns are identified and then broken down by educational stage: Early Childhood Education (ECE), Primary Education (PE), and Pre-service Teacher Training (PTT). Chi-square (χ^2) analyses were used to determine statistically significant differences ($p \leq 0.05$).

Contents of Environmental Education Interventions

Analysis of the content addressed (Figure 2) revealed a strong emphasis on the natural environment (33.1%) and ecological environmental problems (20.0%), which together accounted for over half of the reviewed interventions. Content related to socioeconomic, ethical, or health-based perspectives was much less frequent, each comprising less than 5% of the sample.

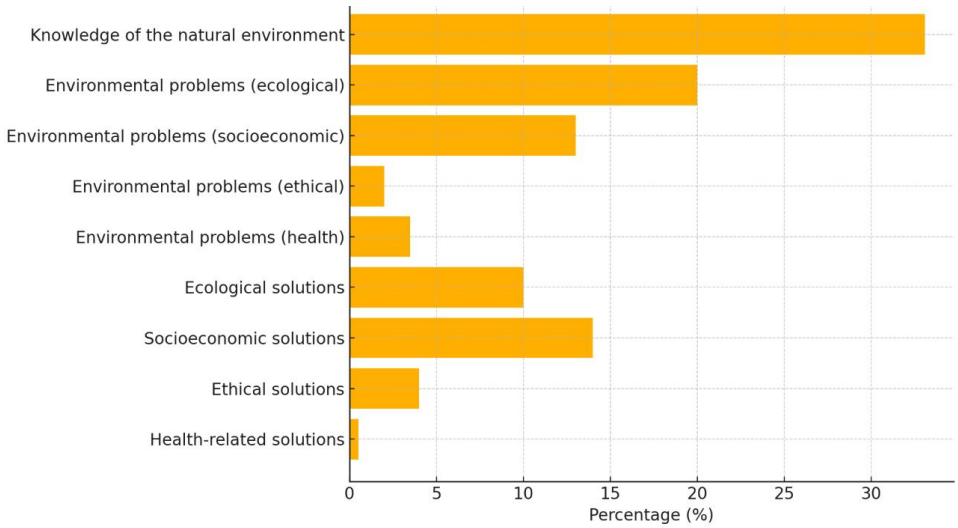

Figure 2. *Distribution of Content Types in Reviewed Environmental Education Interventions*

A comparison of content by educational stage (Table 4) revealed no significant variation in the overall topics addressed across stages (χ^2, $p > 0.05$). However, minor trends were observed. For example, ECE showed relatively more emphasis on socioeconomic solutions (18.8%), while PE and PTT leaned toward ecological problem-solving (21.9% and 20.0%, respectively).

Table 4

Frequency (%) Of Content Addressed According to Educational Stage

Content Type	ECE (%)	PE (%)	PTT (%)
Knowledge of the natural environment	37.5	34.4	30.0
Environmental problems (ecological perspective)	12.5	21.9	20.0
Environmental problems (socioeconomic perspective)	12.5	12.5	14.0
Environmental problems (ethical perspective)	0.0	0.0	2.0
Environmental problems (health perspective)	0.0	4.7	6.0
Ecological solutions	12.5	10.9	10.0
Socioeconomic solutions	18.8	9.4	14.0
Ethical solutions	6.3	4.7	4.0
Health-related solutions	0.0	1.6	0.0

Depth Level of Interventions

The depth of engagement in the interventions was examined based on three categories: content knowledge, awareness-raising, and action-taking. As shown in Figure 3, most activities focused on awareness (44.1%) or knowledge transmission (40.1%), with only 15.8% encouraging students to take action.

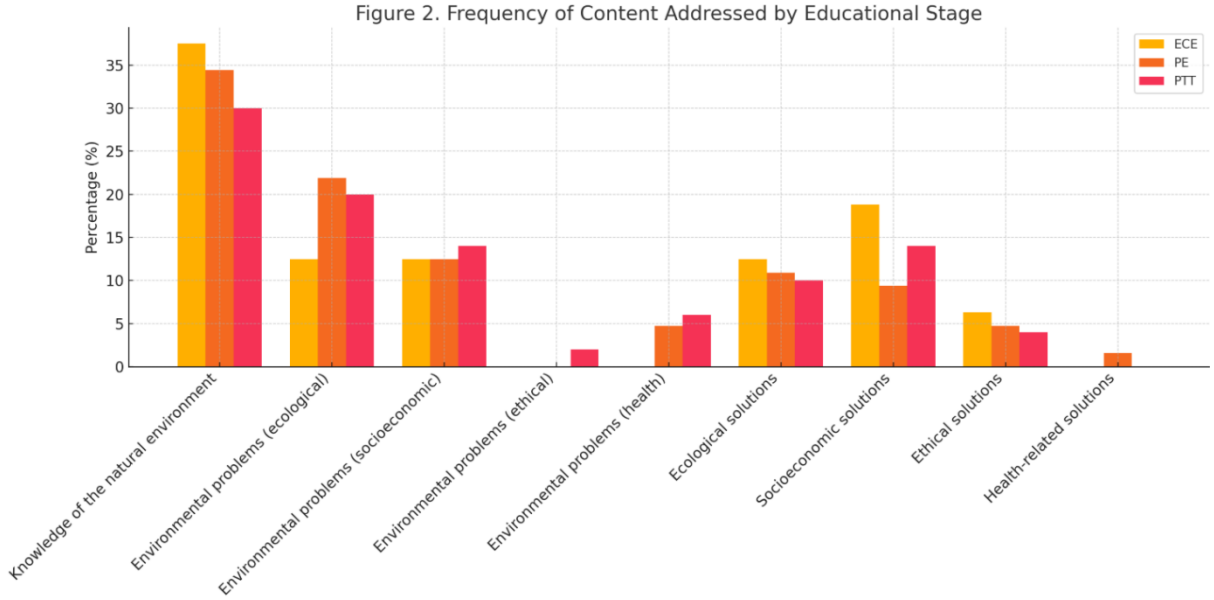

Figure 3. *Depth Level of Environmental Education Interventions*

Subcategory analysis revealed an ecological bias in both knowledge and awareness components. For action-taking, most interventions merely encouraged idea generation, with very few extending to local or global action.

Figure 4 presents depth level across educational stages. Notably, ECE exhibited a relatively high proportion of action-based interventions (36.0%), unlike PE (10.5%) and PTT (17.5%). In contrast, awareness-raising increased with education level, reaching its peak in PTT (52.3%).

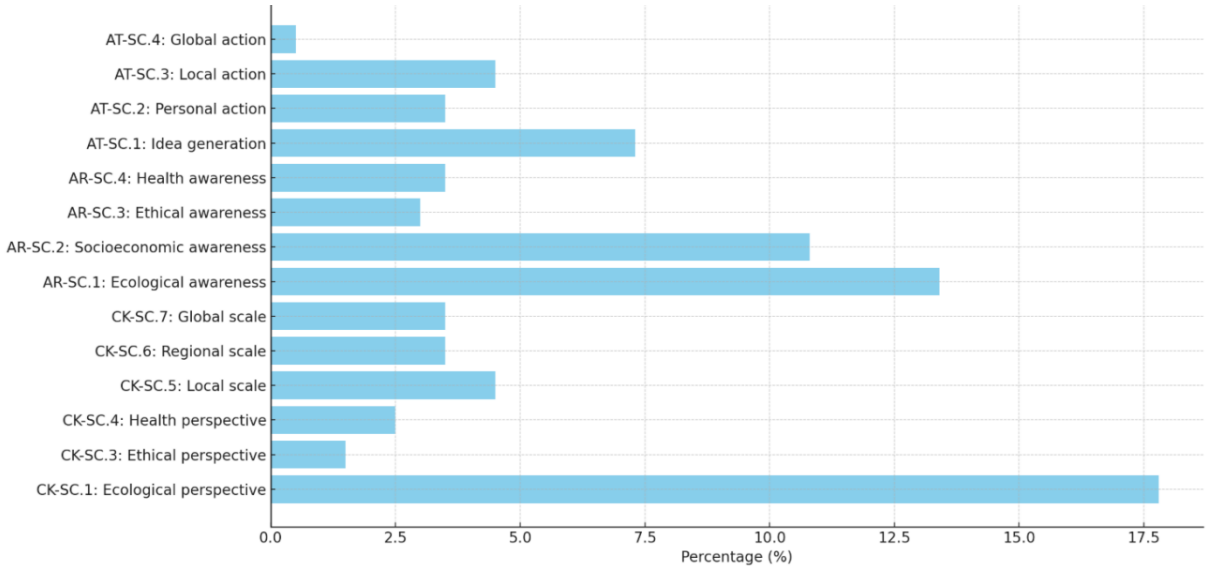

Figure 4. *Depth Level By Educational Stage (Significant Differences: $p \leq 0.05$)*

Actions Required of Students

Table 5 outlines the types of actions required from students. The most common were acquiring conceptual knowledge (13.8%), collaborative work (9.8%), and information search (8.0%). Actions promoting critical thinking, attitudinal change, or reflection on future scenarios were far less frequent (all under 6%).

Table 5

Frequency (%) of Actions Requested from Students by Educational Stage

Action Type	ECE	PE	PTT	Total (%)
Learning conceptual knowledge	1.8	7.7	4.3	13.8
Working collaboratively	1.8	4.0	4.0	9.8
Searching for information	1.5	3.1	3.4	8.0
Discovering basic environmental aspects	1.5	4.3	2.1	8.0
Learning procedural knowledge	1.5	4.6	1.5	7.7
Questioning prior knowledge	0.9	1.8	3.4	6.1
Developing critical thinking	0.6	2.1	3.1	5.8

Taking action for the environment	0.9	2.5	0.6	4.0
Reflecting on everyday life	0.6	2.1	1.2	4.0
Reflecting on desired future	0.6	1.2	0.9	2.8

Significant differences were found between educational stages only for the category "questioning assumed knowledge", which was higher in PTT (χ^2, $p \leq 0.05$). Furthermore, action types also varied with content type: conceptual learning and critical thinking were linked to ecological issues, while health and ethical issues promoted more reflective or value-based responses (χ^2, $p \leq 0.05$).

Resources Used

As shown in Figure 5, self-made materials (18.4%) were the most commonly used resources in interventions, followed by group dynamics (14.9%) and field outings (14.2%). Less frequent were literary materials, audiovisual content, and expert visits, each under 6.5%.

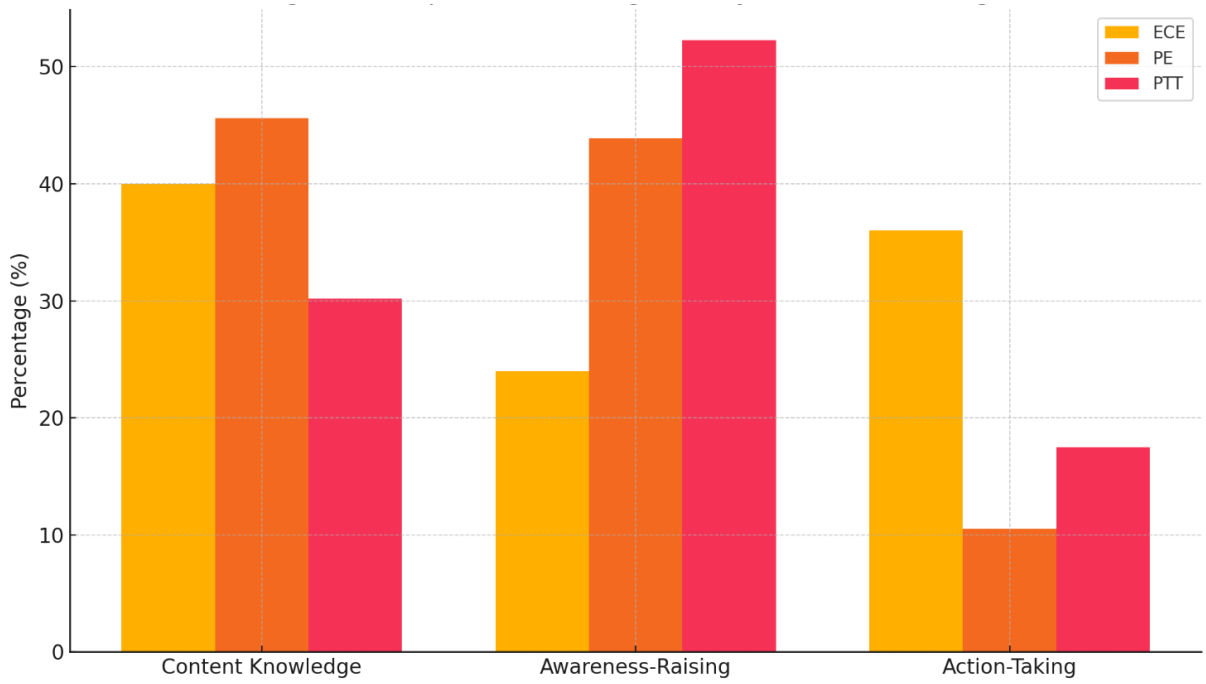

Figure 5. *Distribution of Resources Used in Environmental Education*

Table 6 displays the distribution of resources by educational stage. Differences were found for group dynamics, literary resources, and images. ECE relied more on literary and visual content, while PTT focused more on group activities (χ^2, $p \leq 0.05$).

Table 6

*Resources Used By Educational Stage (in %) (*Significant if p ≤ 0.05)*

Resource Type	ECE (%)	PE (%)	PTT (%)	p-Value
Self-made materials	18.2	20.3	16.3	0.169
Group dynamics/games	15.2	11.9	18.4	0.045 *
Field outings	3.0	20.3	14.3	0.301
Images	18.2	10.2	8.2	0.005 *
Literary resources	15.2	6.8	0.0	0.000 *
Audiovisual material	9.1	3.4	6.1	0.078
Expert visits	3.0	6.8	6.1	0.948

Significant associations were also found between resource type and content. For instance, field trips were frequently used to teach natural environment knowledge (χ^2, $p \leq 0.05$), while self-made materials were more prevalent in interventions addressing socioeconomic solutions (χ^2, $p \leq 0.05$).

Results and Discussion

The primary aim of this systematic review was to examine how environmental education (EE) has been implemented in Early Childhood Education (ECE), Primary Education (PE), and Pre-Service Teacher Training (PTT) classrooms from the perspective of environmental justice (EJ). The findings indicate that despite increased attention to sustainability and justice-oriented goals in global educational agendas, such as the 2030 Agenda for Sustainable Development (United Nations, 2015), classroom practices continue to reflect limited integration of these paradigms.

The analysis revealed that more than half of the reviewed classroom interventions focused on either “knowledge of the natural environment” or “ecological environmental problems.” This supports earlier studies indicating that EE in practice remains primarily ecological in scope, often marginalizing socioeconomic, ethical, and health dimensions (Clark & Miles, 2021; Dawson & Carson, 2020). These results also align with critiques of EE's conceptual narrowness, where scientific-technical knowledge is privileged over social, ethical, and participatory dimensions (Mogensen & Mayer, 2009; Olsson & Gericke, 2016).

The persistent prioritization of ecological issues could be attributed to curricular traditions that treat environmental science as a natural science topic rather than a multidisciplinary field (Hofman-Bergholm, 2018). Despite the explicit call for an integrated, systemic perspective by international frameworks such as the Belgrade Charter (1975) and

subsequent UNESCO reports (UNESCO, 2017), the findings suggest that such integration is yet to be realized in most classrooms. Teachers may lack training or resources to effectively incorporate diverse perspectives such as environmental ethics, health equity, or social justice (Dimick, 2012; Pérez-Martín et al., 2022).

When examining the pedagogical depth of interventions, the majority were found to emphasize either content knowledge or awareness-raising. Action-taking activities—those that allow students to engage with real-world problems and propose or implement solutions—comprised less than 16% of interventions. This imbalance raises concerns, particularly in light of the theoretical foundations of transformative environmental education, which emphasize participatory and experiential learning as essential for fostering sustainability-oriented behavior change (Rodríguez Aboytes & Barth, 2020; Valladares, 2021).

These results are in line with earlier findings indicating that simply transmitting environmental knowledge does not necessarily lead to pro-environmental behavior (Otto & Pensini, 2017; Olsson et al., 2022). While interventions aimed at raising awareness are important, they must be complemented by strategies that promote critical reflection and agency (Bächtold et al., 2022). The lack of such action-based approaches is especially problematic in PTT programs, where future educators should be equipped to model and facilitate environmental citizenship (Mora & Guerrero, 2022).

Interestingly, the data also show that ECE interventions included a relatively higher proportion of action-oriented activities compared to PE and PTT. This may reflect the more hands-on, experiential nature of early childhood curricula, but also raises questions about missed opportunities in higher stages of education. As Otto et al. (2019) argue, early experiences with nature and social responsibility are foundational for long-term environmental engagement, and should be built upon rather than replaced by abstract knowledge as students advance through the education system.

Further analysis of the "actions required of students" revealed a strong focus on lower-order cognitive skills such as conceptual understanding, information search, and basic environmental exploration. Actions linked to critical thinking, ethical reasoning, or civic engagement—such as "questioning assumed knowledge," "reflecting on everyday life," or "acting in favor of the environment"—were significantly less frequent.

These findings suggest a disconnect between the goals of environmental justice education and actual classroom practices. As noted by Sjöström and Eilks (2018), critical scientific literacy should empower learners to engage with complex socio-environmental issues

in thoughtful and transformative ways. However, our findings suggest that such literacy is rarely cultivated through current EE interventions.

Furthermore, the study identified a lack of progression in pedagogical goals across educational stages. One would expect increasingly complex and autonomous student actions in PTT, particularly given the importance of cultivating reflective teaching practice (Walter et al., 2020; Pérez-Martín & Bravo-Torija, 2018). Instead, the tasks required of pre-service teachers mirrored those of younger students, lacking the depth needed to prepare them for integrating environmental justice into their future classrooms.

In terms of instructional resources, the predominance of self-made materials points to a possible lack of access to or dissatisfaction with existing EE resources. This interpretation is consistent with studies showing that commercially available textbooks often fail to address sustainability in meaningful ways, focusing on reductive themes such as recycling without fostering deeper understanding (Martínez-Medina & Arrebola, 2019).

Group games and field outings were common, particularly in ECE and PE. While such activities can support experiential learning (Herman et al., 2023), they must be structured to include reflection and decision-making to align with the goals of environmental justice education. Otherwise, they risk becoming mere recreational activities devoid of transformative potential (Herman et al., 2021).

The study also found that certain types of resources, such as literary texts and audiovisual materials, were underutilized, particularly in PTT. Given their potential to humanize environmental issues and provoke ethical reflection (Ben-Zvi-Assaraf & Knippels, 2022), integrating such resources could greatly enhance the EJ orientation of EE practices.

Recommendations

The lack of differentiation in content and pedagogy across educational stages underscores the need for clear curricular frameworks that define learning outcomes related to environmental justice by age group. Without such guidance, educators may default to traditional, knowledge-centered approaches that fail to build the competencies required for sustainability and justice.

The underrepresentation of classroom interventions in the literature (only 49 out of over 700 articles reviewed) points to a research-practice gap that limits our understanding of how EJ principles can be effectively implemented in real educational settings (Moore, 2023; Guevara-

Herrero et al., 2023). This may be due in part to the theoretical nature of much environmental justice literature, which tends to lack pedagogical specificity (Clark & Miles, 2021).

Moreover, the methodological decision to include only JCR and SJR-indexed journals, while ensuring quality, may have excluded relevant case studies and classroom-based research published in local or practitioner-oriented outlets. Future reviews should consider incorporating a broader range of sources to capture the diversity of practices and contexts in environmental education.

Ethical Committee Approval

The decision numbered 2025/04, dated 16/04/2025, was issued by the İstinye University Human Research Ethics Committee.

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