Health Leadership and Quality of Life. 2025; 4:650
doi: 10.56294/hl2025650

REVIEW

Analysis of Theoretical Foundations on Environmental Awareness in Early Childhood Education: A Systematic Review

Análisis de los Fundamentos Teóricos sobre la Conciencia Ambiental en Educación Inicial: Revisión Sistemática

María Aquije Mansilla[1]

[1]Universidad César Vallejo. Lima, Perú.

Cite as: Aquije Mansilla M. Analysis of Theoretical Foundations on Environmental Awareness in Early Childhood Education: A Systematic Review. Health Leadership and Quality of Life. 2025; 4:650. https://doi.org/10.56294/hl2025650

Submitted: 11-06-2024 **Revised:** 10-11-2024 **Accepted:** 22-05-2025 **Published:** 23-05-2025

Editor: PhD. Neela Satheesh

Corresponding author: María Aquije Mansilla

ABSTRACT

Introduction: the growing global environmental crisis has increased the need to foster ecological awareness from the earliest stages of human development. In this context, environmental education in early childhood emerges as a fundamental strategy for planting long-term sustainable values and attitudes.
Objective: this study aims to analyze, through a systematic review, the main academic research related to environmental education aimed at young children, identifying approaches, pedagogical strategies, and factors that promote ecological awareness in early childhood.
Method: a systematic review was conducted of 68 scientific articles published between 2019 and 2025, selected from international academic databases. The studies were analyzed using thematic coding, considering variables such as the age of participants, type of educational intervention, the role of the family, teaching methodologies, and reported outcomes.
Results: the active role of the family as an environmental education agent; the value of direct contact with nature; the use of innovative pedagogical resources such as storytelling, games, technology, and art; the cross-curricular integration of environmental education; and the emotional, cultural, and social factors that influence children's relationship with the environment. Furthermore, a significant improvement in pro-environmental attitudes is observed when experiences are meaningful, contextualized, and collective.
Conclusion: environmental education in early childhood is essential for shaping citizens committed to protecting the planet. Its effectiveness depends on a holistic integration between school, family, natural surroundings, and community. It is recommended to promote public policies that strengthen these bonds and invest in teacher training to ensure sustainability education from the early years of life.

Keywords: Environmental Education; Ecological Awareness; Sustainability Education; Experiential Pedagogy; Family and Environment; Nature-Based Learning.

RESUMEN

Introducción: la creciente crisis ambiental mundial ha incrementado la necesidad de fomentar la conciencia ecológica desde las primeras etapas del desarrollo humano. En este contexto, la educación ambiental en la primera infancia se perfila como una estrategia fundamental para sembrar valores y actitudes sostenibles a largo plazo.
Objetivo: este estudio tiene como finalidad analizar, mediante una revisión sistemática, las principales investigaciones académicas relacionadas con la educación ambiental dirigida a niños de educación inicial, identificando los enfoques, estrategias pedagógicas y factores que favorecen la conciencia ecológica en la niñez.

Método: se realizó una revisión sistemática de 68 artículos científicos publicados entre 2019 y 2025, seleccionados de bases de datos académicas internacionales. Los estudios fueron analizados mediante codificación temática, considerando variables como edad de los participantes, tipo de intervención educativa, rol de la familia, metodologías didácticas y resultados reportados.
Resultados: los resultados revelan cinco categorías centrales: el papel activo de la familia como agente formador ambiental; el valor del contacto directo con la naturaleza; el uso de recursos pedagógicos innovadores como narrativas, juegos, tecnologías y arte; la transversalidad del enfoque ambiental en el currículo; y los factores emocionales, culturales y sociales que influyen en la relación niño-medioambiente. Además, se evidencia una mejora significativa en actitudes proambientales cuando las experiencias son significativas, contextualizadas y colectivas.
Conclusión: la educación ambiental en la primera infancia resulta esencial para formar ciudadanos comprometidos con el cuidado del planeta. Su efectividad depende de una integración holística entre escuela, familia, entorno natural y comunidad. Se recomienda promover políticas públicas que refuercen estos vínculos y la capacitación docente para garantizar una educación para la sostenibilidad desde los primeros años de vida.

Palabras clave: Educación Ambiental; Conciencia Ecológica; Sostenibilidad Educativa; Pedagogía Vivencial; Familia Y Medioambiente; Naturaleza y Aprendizaje.

INTRODUCTION

Currently, environmental awareness in children faces serious difficulties at a global level. According to an international study published in The Lancet Planetary Health,[1] which surveyed more than 10000 young people in ten countries, approximately 60 % of children are "very or extremely concerned" about climate change. This same study reveals that many of these young people experience feelings of sadness, fear, or anxiety in relation to the environmental future of the planet, which reflects a generalized eco-anxiety. This situation shows that, although children and young people perceive environmental threats, they often lack a structured guide from education systems to transform their concern into responsible and sustainable actions.

Despite the increase in environmental awareness campaigns, educational efforts are still insufficient. Data from the World Health Organization (WHO)[2] show that although children make up only 10 % of the global population, they are responsible for more than 40 % of diseases caused by environmental factors. This is because polluted environments, exposure to chemicals, and poor waste management in urban and rural areas disproportionately affect children, who have more vulnerable immune systems. Limited access to eco-friendly content adapted to their age and cultural environment prevents them from developing sound environmental awareness from an early stage.

In addition, studies such as those at the University of Bath and UNICEF[3] reveal that more than 70 % of young university students in developed countries manifest symptoms of eco-anxiety. This is not only an indicator of concern, but also of a possible lack of adequate psychoeducational strategies to channel these types of emotions in school classrooms. The situation requires rethinking the theoretical foundations with which environmental awareness is approached from early education, including more integrative, emotional, and adaptive approaches to contemporary ecological challenges.

In Chile, a survey by the Center for Public Studies revealed that 79 % of citizens support the creation of an ecological constitution that recognizes the right to a healthy environment. This social support is also reflected in pedagogical initiatives that promote outdoor education and nature-based learning.[4] However, many of these strategies have not been widespread due to logistical and curricular limitations, and in urban areas their application is almost non-existent. Despite these limitations, the country is experiencing a growing ecological mobilization, especially after the social outbreak of 2019, where the environmental dimension was an important part of the citizens' discourse.[5]

In Ecuador, the country has made considerable progress in protecting its biodiversity: 19 % of its territory is protected under some legal category, and it is projected to reach 32 % in the coming years. Ecuador's 2008 Constitution is a pioneer in recognizing the "rights of nature," which provides a unique institutional framework to foster environmental awareness from early childhood education. However, in rural and marginal areas, teachers face difficulties in integrating these concepts due to the lack of training and specific teaching resources.

In Colombia, a study of Ipsos Global Advisor[6] indicates that 87 % of citizens perceive climate change as a serious or very serious problem, and 74 % say they are willing to change their habits to deal with it. The government has developed programs such as the "Climate Schools," which have trained more than 70 000 students. However, these initiatives do not yet reach all regions of the country, and, in many areas affected

by armed conflict or extreme poverty, children grow up without effective environmental education. Ecological awareness is growing, but uneven in coverage and intensity, depending largely on the socio-political context.[7]

In Bolivia and Brazil, although the constitutions recognize the right to the environment and ecological initiatives are developed, great inequalities persist. Rural and Indigenous populations have less access to environmental educational content. A World Bank report [8] showed that in Andean countries such as Peru, Bolivia and Ecuador, access to drinking water and sanitation in poor communities is limited, which also conditions ecological awareness from an early age. Structural conditions make it difficult for early childhood education to effectively integrate sound environmental foundations into the education of children.

In the case of Peru, environmental awareness in children in early childhood education is affected by multiple structural and pedagogical factors. A study conducted in the Madre de Dios region by the National Amazonian University revealed that, although adolescents show a high motivation to take care of the environment, their knowledge is mostly "regular" and disjointed. This situation reflects a more informative than formative approach in environmental education, which is insufficient to foster critical and active awareness from the first school years. In rural areas, moreover, limited access to technologies and teaching materials hinders the development of effective environmental programs.[9]

A report by UNICEF Perú[10] indicated that only 62 % of Peruvian children and adolescents feel capable of influencing decisions related to climate change. This lack of empowerment translates into apathy or ignorance about everyday ecological practices, even though many of them live in environments highly affected by pollution or deforestation. The study highlights the urgency of strengthening environmental education in the national curriculum, especially from the initial stage, where fundamental values and attitudes in child development are consolidated.

Likewise, specific environmental problems such as air pollution or the scarcity of drinking water continue to be a reality for thousands of families. In Metropolitan Lima, according to data from the Ministry of the Environment.[11] The levels of polluting particles exceed the permissible limits by more than 122 %, and only 87 % of the inhabitants have continuous access to drinking water. This direct exposure to adverse ecological conditions does not automatically translate into greater environmental awareness if it is not accompanied by deep, coherent, and sustained educational work from childhood.

Theoretical foundations of children's environmental awareness

Environmental awareness in childhood is based on various theories of human development that explain how children construct their understanding of the natural environment and their role in it. From evolutionary psychology, authors such as Jean Piaget argue that in the preoperational stage (2 to 7 years), children develop symbolic thinking and begin to attribute meanings to objects and natural phenomena, although still from an egocentric perspective.[12,13] Lev Vygotsky, on the other hand, highlights the role of the sociocultural environment and language as mediators in learning, which suggests that environmental awareness is enhanced through interaction with adults and peers, especially in school and family contexts. These theories agree that environmental education should not only be informative, but experiential, socially, and emotionally meaningful for children.[12,13,14,15]

From a pedagogical perspective, children's environmental awareness is closely related to education for sustainable development (ESD), which promotes competencies such as empathy with nature, ecological responsibility, and active participation in the protection of the environment. In this framework, Eco pedagogy, proposed by Paulo Freire and later expanded by authors such as Gadotti, states that environmental learning should be oriented towards social transformation and not only towards the acquisition of knowledge about the environment. Thus, the aim is for children, even from an early age, not only to understand nature, but also to feel an active part of it. This implies an integration between the cognitive, the ethical and the affective in the educational process, allowing a comprehensive education with an ecological sense.[16,17]

Educational models and approaches to promote environmental awareness in early childhood education

Various educational approaches have been applied to promote environmental awareness from early childhood. One of the most outstanding is experiential learning, where children interact directly with nature through sensory activities, games, field trips or school gardens. This methodology is based on the idea that physical and emotional contact with the natural environment allows the formation of affective bonds with nature, which generates a more solid and lasting attitude of care. In Scandinavian countries, for example, forest schools have shown positive effects on children's ecological awareness and emotional well-being, promoting respect, curiosity and reflection on ecosystems.[18]

Another relevant approach is critical environmental education, which states that teaching should go beyond the transmission of data on recycling or pollution, to analyze the social and structural causes of environmental problems. In this model, it is sought to be taught that even young children begin to develop basic notions of ecological justice, equity, and co-responsibility. This does not mean burdening the child with complex

information but adapting the content to their cognitive and emotional level, using stories, symbolic games, theater, puppets, or audiovisual materials. In this way, an active and transformative understanding of the environment is promoted from the initial classroom.[1]

Factors Influencing the Development of Children's Environmental Awareness

The development of environmental awareness in childhood does not depend exclusively on the school curriculum, but on a set of interrelated factors that include the family, the community, the media, and the physical environment. The family, as the first socializing agent, plays an essential role: when parents practice sustainable habits such as recycling, saving water or eating responsibly, children tend to replicate these behaviors. In the same way, living in a natural or urban environment influences children's perception of the environment: those who grow up surrounded by nature more easily develop bonds of affection and respect for it.[19,20,21]

Sociocultural and economic factors also play a role. In contexts of poverty or vulnerability, unmet basic needs often make it difficult for families or schools to prioritize environmental education. In addition, in marginalized urban sectors, the lack of green areas and the predominance of pollution reduce opportunities to gain experience about the environment in an experiential way. Likewise, digital media have a double influence: although they can raise awareness through documentaries or children's content about nature, they can also encourage excessive consumption and disconnection from the natural world. Therefore, environmental education must be designed in a contextualized way, taking into account the cultural, social and emotional characteristics of the child.[22]

Current challenges and future perspectives in children's environmental education

One of the main challenges of environmental education in early childhood children is its weak presence in the official curricula of many countries. On many occasions, environmental issues are addressed in a transversal or superficial way, without a clear methodology, without adequate teaching resources or specialized teacher training. This situation limits the development of coherent and sustainable programs in the long term, especially in the early school years, when the foundations of ethical thinking and social sensitivity are formed. Added to this is the curricular overload and the low priority given to training in environmental values over more "evaluable" content.[23]

However, there are signs of positive transformation. In recent years, international organizations such as UNESCO and UNICEF have promoted global initiatives to integrate environmental and climate education from childhood. The need to include skills such as ecological empathy, sustainable decision-making and community participation from the earliest educational levels is raised. In addition, technological advancement has allowed the design of interactive materials and educational applications that can complement environmental learning in a playful and meaningful way. The future of children's environmental awareness will depend, to a large extent, on a solid alliance between public policies, teacher training, family participation and social commitment.[24,25]

METHOD

Research Focus

This research adopts a qualitative documentary approach, focused on the systematic analysis of the scientific literature on the theoretical foundations that support environmental awareness in children in early education. The systematic review method based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement is used, in order to guarantee the transparency, completeness and reproducibility of the process of searching, selecting and analyzing academic sources.[26,27]

Sources of information

Data collection was conducted by searching for scientific articles in the SCOPUS and Web of Science (WoS) databases, recognized for their high editorial rigor and international coverage. Boolean operators and key terms such as: "environmental awareness", "early childhood education", "environmental education", "theoretical foundations", "green pedagogy", "eco-literacy" and their respective combinations were used. The search period ran from 2020 to 2025, to guarantee the timeliness and relevance of the publications included in the analysis. To do this, the following search algorithm was used in SCOPUS:

(TITLE-ABS-KEY ("Environmental Awareness") AND TITLE-ABS-KEY (education) AND TITLE-ABS-KEY (child)) AND PUBYEAR > 2019 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (LANGUAGE , "English"))

Inclusion criteria

- Indexed in Scopus or Web of Science.
- Published between 2020 and 2025.

- Be available in full text and in open or institutional access.
- Contain relevant, clear, and pertinent information regarding the theoretical foundations of children's environmental awareness.
- Focus on the level of initial education or early childhood (0 to 6 years).
- Publications in Spanish, Portuguese, and/or English.

Exclusion Criteria

- Do not meet criteria of academic rigor (personal essays, blogs, unpublished theses, abstracts without full text).
- They were not focused on preschool or toddler children.
- They will focus only on environmental impacts, without theoretical or pedagogical relationships.
- Were duplicate or redundant publications.
- They will focus exclusively on university or secondary education contexts.

Study selection process

- Identification: initial search in databases with defined terms.
- Screening: removal of duplicates and review of titles/abstracts.
- Eligibility: full reading of shortlisted articles.
- Final inclusion: selection of studies that rigorously meet the established criteria.

Analysis of information

During the identification stage, a total of 438 scientific articles were retrieved from the Scopus and Web of Science databases, using combinations of key terms related to environmental awareness, early education, and theoretical foundations. Subsequently, the previously defined inclusion and exclusion criteria were applied, which implied an exhaustive review of the titles, abstracts, and full texts. After eliminating duplicates, irrelevant studies, articles without full access, or those that did not focus on the level of initial education, a final sample of 68 articles selected for systematic analysis was obtained, as can be seen in figure 1.

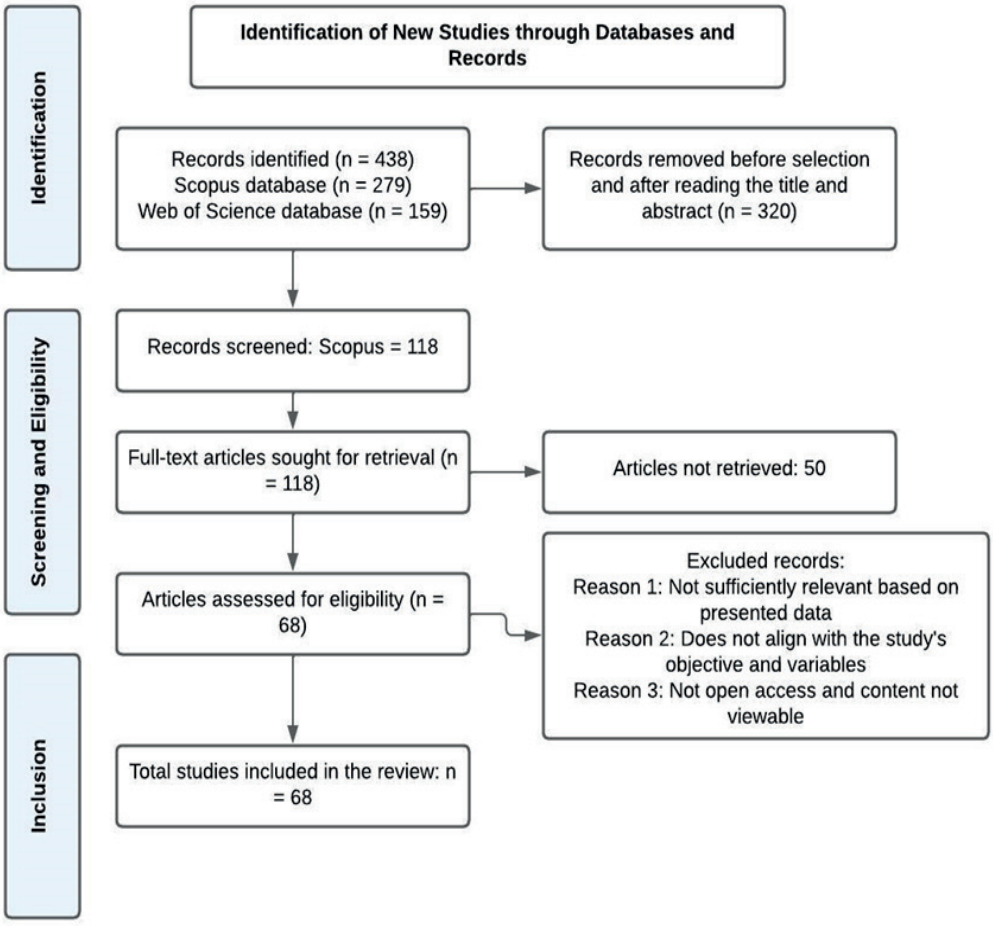

Figure 1. PRISM Flowchart

Once the articles were selected, a data extraction matrix was made to systematize key information: authors, year, country, objectives, type of study, theories addressed, main findings and conclusions. The analysis was of a qualitative interpretative type, aimed at identifying patterns, similarities, and theoretical differences between the studies, as well as gaps in the literature. This made it possible to elaborate a critical synthesis that supports the theoretical bases of the phenomenon investigated.

RESULTS AND DISCUSSION

Playful, artistic, and narrative activities as effective educational strategies

The studies reviewed show a variety of effective pedagogical strategies to strengthen environmental awareness in childhood. Playful and creative methodologies stand out as highly effective in early education. For example, Çetingöz, Altuğ y Düzyol Türk[28], they identified that art activities with an ecological approach, such as the use of recycled materials, not only stimulate children's creativity, but also promote sustainability values from an early age. In the same line, Lu et al.[29] showed that AI-generated narratives combined with visuals about urban mining enabled children to understand complex concepts of sustainability. Hudhana, Sumarlam y Sumarwati[30] also reported significant advances in children's Eco literacy through the use of digital comics about environmental legends. In addition, the use of serious games, as in the case of Garcia et al.[31] allowed to improve the understanding of the water cycle in urban contexts and to promote a responsible attitude towards water resources.

Iwasaki[32] showed how stories and activities about water care directly influenced the daily habits of children in Japan. Similarly, Aurélio et al.[33] found that reading books with an environmental focus fosters greater ecological understanding. Arabaci y Okyay[34] found that shared reading contributes to improving the pro-environmental attitudes of preschool children. Huang y Kennedy[35] developed an illustrated book and games on native flora, which increased interest and environmental knowledge. Nurhayani[36] delved into the impact of traditional narratives, such as the tales of the mouse-deer, to promote empathy towards animals and the environment. These approaches demonstrate that art, literature, and play are powerful tools in children's environmental education.

Some novel approaches incorporate art and the body as pedagogical means to connect with the environment. Preston[14] proposed a transgressive eco-artistic pedagogy that combines contemporary art and ecological justice in the formation of critical consciousness. Pomer[37], from the field of dance, she highlighted how conscious body movement can be a vehicle for perceiving and responding to the environment, articulating a sensory relationship with nature. These methods reinforce a more comprehensive education, which incorporates the emotional and aesthetic dimension of environmental learning.

Integration of digital technologies and educational theories

The use of technological resources is also shown to be a cross-cutting axis in environmental promotion. Kanaki, Chatzakis y Kalogiannakis[38] used Bee-Bot educational robots for children to program ecological routes, strengthening both computational thinking and ecological awareness. Sezer Balci, Öğüt Düzen y Yalçın[39] implemented a program based on the theory of social learning that allowed children from 60 to 72 months to understand the notion of ecological footprint, achieving statistically significant results in the increase of sustainable attitudes.

The leading role of families in children's environmental education

Another relevant result is the fundamental role of families in strengthening children's environmental awareness. Sihvonen et al.[40] showed that parental involvement in eco-friendly school activities, such as gardening or co-recycling, enhances learning and reinforces habits at home. In line with, Seemüller et al.[41] found that parents' ecological identity is directly related to children's sustainable mobility behaviors, such as walking or cycling to school. In contexts of confinement due to the pandemic, Novikova y Gallo-Fox[42] revealed that the nature at home programs maintained the children's connection with the natural environment, thanks to the active involvement of families.

Teacher training as the basis of effective environmental education

The evidence also underlines that the level of teacher training and commitment directly influences the effectiveness of environmental education. Alanazi y Alrwaili[43] noted that while early education teachers in Saudi Arabia recognize the importance of their role in ecological awareness, they are limited by a lack of specific training. This contrast can be seen in the findings of Miyasaka y Honda[44] who reported that teacher education programs in Japan, focused on environmental planning and management, not only increased teachers' ecological knowledge, but also their motivation to promote pro-environmental behaviors in the classroom. Ma[45] from a curricular approach, it showed how representations of nature in textbooks indirectly influence children's perception of the environment, highlighting the need to include images and stories connected to

local biodiversity.

Influence of the school environment and quality of outdoor spaces

Likewise, progress in the improvement of educational infrastructure and its physical environment is recognized as essential elements in environmental awareness. Sekulova and Mallén[46] showed that the configuration of spaces such as green playgrounds depends on school governance and that these can be transformed into experiential learning environments when they are properly managed. In this line, Küpeli y Bayındır[47] found that the quality of outdoor spaces in kindergartens predicts the development of positive attitudes towards nature, with direct experience being a key factor. In this sense, Ma[45] y Lu et al.[29] agree that well-designed, aesthetically pleasing environments connected to nature stimulate ecological learning.

Outdoor activities and sensory experiences with nature

The results also highlight the importance of outdoor activities and direct interaction with nature. Ural[48] through the analysis of drawings, he concluded that children express positive emotions towards nature when they have contact with it, describing it as a happy and safe place. Arbor y Matteson[49] found that nature journaling not only improves the mood of high school students, but also strengthens the emotional bond with the natural environment. Berasategi Sancho et al.[50] added that the children's autonomous journeys to school favor the sense of belonging and the conscious observation of the environment. In the same way, Faganel y Kovač[51] demonstrated that activities such as exploring insects, touching the ground or observing trees promote critical and sustained reflections on the care of the planet. At last, Dabaja[52] highlighted the positive impact of forest schools, where children learn through free play in natural spaces, developing greater independence, creativity and ecological responsibility.

Community, cultural and artistic approaches in ecological education

On the other hand, approaches that integrate cultural and community diversity in environmental education are recognized. Farra and Bates[53] in a rural community in Ecuador, adopted a methodology focused on local art and culture to redefine the concept of quality education from an environmental perspective. Likewise Contreras Ameduri[54] addressed how women ornithologists in the nineteenth-century U.S. influenced modern Eco pedagogy, integrating birdwatching and respect for biodiversity as educational tools. Mohamed et al.[12] for their part, they analyzed afforestation initiatives in Egypt and Saudi Arabia, concluding that children can and should be an active part of these national projects, contributing to the environmental well-being of their communities.

Numerous studies underline the benefits of education in direct contact with the natural environment. Talebpour et al.[55] found that residential environmental education programs strengthen the emotional connection with nature. Heras, Medir and Salazar[13] noted that school trips to natural environments have positive effects on the perception of the value of biodiversity. Beauchamp et al.[56] explored the implementation of outdoor learning in Quebec, revealing high student motivation and improvements in content retention. Wold et al.[57] showed that Norwegian children who access this type of experience better recognize animal species and their habitats. Arief et al.[25] highlighted the impact of bio-based learning as a way to internalize sustainable practices. These approaches validate active and sensory learning as the core of effective environmental education.

Changes in children's attitudes and environmental perceptions

Studies show empirical evidence on changing attitudes and environmental perceptions in children. Yfantidou et al.[58] showed that through physical activities with an environmental focus, children's willingness to act in favor of the planet is increased. Deng et al.[59] observed that biophilic designs in classrooms (use of plants, natural light, and organic materials) favor children's concentration and engagement with ecological issues. In addition Howe et al.[60] reported that participation in citizen science related to insects awakened in students and teachers a clear intention to participate in future environmental activities. Even though Xie and Lin[61]focused on the adult public, their findings on the variation of public perception towards waste incineration plants show how continuous environmental education generates sustained changes in social opinion and behavior towards the environment.

Green education in formal and informal spaces

Environmental awareness is also cultivated through educational experiences in various contexts. Gilleran Stephens, Short y Linnane[21] they pointed out how an intergenerational environmental education program increased learning in children and adults, highlighting the importance of the family as an educational agent. Roma, Tardif-Williams y Bosacki[62] studied children's conceptions of animal rights and welfare, demonstrating their sensitivity to ecosystems. Stanisic, Maksic y Nenadic[63] analyzed predictors of environmental awareness in schoolchildren in Serbia, such as information received at home and in the media. For its part, Thapa[64] presented

the case of a "green school" in Sikkim (India), which had a positive impact on the ecological commitment of its students.

Fostering sustainable attitudes is best achieved through practical and meaningful activities. Thor y Karlsudd[65] proposed an action-oriented model of environmental education, validated in school contexts. Yen et al.[66] They identified that playful activities such as symbolic play and art increase sustainable behaviors in children ages 3 to 6. Simsar[67] found that Turkish children with greater awareness of their ecological footprint showed more responsible attitudes. Likewise, Soares et al.[68] stressed that environmental education is perceived as the most relevant tool to combat plastic pollution. These practices allow learning to transcend the theoretical, becoming a habit and concrete action.

Impact of school infrastructure and physical environment

The conditions of the school environment directly influence environmental attitudes. Izadpanah, Parvaresh y Şekerci[23] evaluated how the physical spaces of schools shape the ecological perception in childhood. In the same way, Biber et al.[22] found differences in environmental awareness between children who attended nature-centered kindergartens versus those who attended conventional institutions. Rocher et al.[69] showed that school nautical activities in blue spaces reinforced links with the aquatic environment. This evidence reinforces the importance of considering both pedagogy and the physical design of the educational environment.

Family, Social and Cultural Factors in Environmental Education

The relevance of family, local cultures, and personal identities in the formation of environmental awareness is highlighted. Seemüller et al.[41] showed that parents' ecological identity influences the sustainable mobility of their adolescent children. OKYAY et al.[70] showed that ecological education strengthens environmental attitudes in preschoolers, especially when cultural values are involved. Christodoulou y Grace[22] underlined how children understand biodiversity loss from an active notion of environmental citizenship. In the same line, Nurhayani[36] and Roma et al.[62] show that cultural or family stories can facilitate the transmission of ecological and ethical values. In addition, the survey CEP Chile[4] revealed that family and social factors are key to building a solid environmental perception from an early age.

The role of families in environmental education is once again confirmed. Iwaniec y Curdt-Christiansen[71] highlighted that parents in China act as key agents for the development of environmental literacy, particularly in urban contexts. Khajanchi et al.[72], through a systematic review, they found that socioeconomic status influences early participation in green educational activities, which poses equity challenges. The need to promote inclusive policies becomes evident to ensure that all children, regardless of their context, have access to quality environmental education.

Perceptions, emotions, and attitudes in the face of the environmental crisis

In table 1, research papers were grouped by topic of interest. Those that provided specific results on the topics were also considered, so they were grouped to provide an explanation of their perspectives.

Table 1. comparison of scientific articles

Topic	Related Articles	Key Matches
Education environmental in early childhood	(22,28,29,30,31,34,38,39,40,43,44,45,47,66,72,73,74,75,76)	Studies highlight the importance of introducing environmental education from an early age as a fundamental strategy for the development of sustainable attitudes and behaviors. It is emphasized that the first years are key to promoting respect for nature, environmental responsibility, and the construction of a solid ecological awareness. The most effective methods include playful activities, stories, experimentation, experiential education, and interdisciplinary approaches.
Family and community involvement		There is a consensus on the decisive influence of the family and community environment in the formation of environmental attitudes in children. The articles highlight how the active participation of parents and caregivers can reinforce school learning. In addition, the connection between school and home allows for more meaningful learning that is consistent with the values of the social environment, especially in contexts where sustainability is prioritized as a cultural practice.
Learning in nature and the outdoors	(40,41,41,42,44,71,72)	The articles reveal that direct contact with natural environments (forests, parks, green spaces, wild habitats) improves ecological understanding, strengthens the emotional bond with nature, and promotes pro-environmental behaviors. There is also evidence of a positive impact on the physical and emotional well-being of children. Experiential learning in the open-air favors' autonomy, critical thinking, and appreciation of natural resources.

Use of digital technologies and resources		There is a growing trend in the use of technologies such as educational video games, digital comics, interactive narratives, and mobile apps to foster environmental awareness. These resources are presented as complementary tools that stimulate children's motivation, visual thinking, and active participation in modern educational scenarios, aligned with their everyday digital context.
Art, narrative, and expression as an environmental medium	(13,46,47,48,49,50,52,55,56, 57,59,60)	Artistic expressions (drawing, music, dance, stories, graphic narratives) are effective strategies for communicating environmental values. These practices allow children to explore and express their connection with the environment from creativity and sensitivity. In addition, they foster empathy towards living beings, strengthen ecological identity and allow processes of reflection on the human impact on nature.
Attitudes, values, and ecological citizenship		A shared concern is identified to develop in children not only knowledge, but also values, responsible attitudes, and a sense of ecological citizenship. The articles emphasize the need to cultivate skills such as critical thinking, environmental empathy, commitment to ecological justice, and active participation in sustainable actions from an early age. Factors such as climate anxiety and the perception of political inefficiency in the face of climate change are also mentioned.
Formal education and curricular innovation	(15,29,30,31,33,38)	Studies agree on the urgency of transforming educational curricula to integrate environmental education in a transversal and meaningful way. Innovative initiatives such as green competency-based programs, inclusion of content on climate change, recycling, biodiversity, and sustainability, as well as pedagogical reforms that favor active participation, local contextualization and meaningful learning are discussed.

Some studies addressed the emotional and perceptual aspects of children in the face of climate crisis and pollution. Shabani Isenaj et al.[19] investigated the factors that influence the understanding of polluted air in Kosovar children, revealing differences in perception according to educational level. Güvenir y Türkmen[73] explored environmental attitudes in Turkish children, finding a strong correlation between positive attitudes and experiences with nature. Hickman et al.[1] presented a global study that exposes how children and adolescents suffer from climate anxiety, motivated by the perception of government inaction. These emotions can become both barriers and drivers for future ecological action.

The use of narrative, both oral and written, is consolidated as a powerful strategy for raising awareness. Yang et al.[74] showed that narrative-based environmental education improves ecological attitudes in children aged 6 to 8 years. Beaumont, Briers y Harrison[16] analyzed the representation of turtles and other reptiles in children's literature, concluding that the stories influence the moral and ecological perception of infants. Technology also provides innovative tools: Stock et al.[15] developed the BeeLife mobile application, which, used in school environments, promoted ecological awareness through interactive activities. Thus, literature, digital media and environmental narratives prove to be complementary and effective resources in educational contexts.

CONCLUSIONS

Based on the exhaustive analysis of the research reviewed, it is concluded that environmental education in early childhood represents a fundamental pillar for the formation of a committed ecological citizenship. Studies agree that learning experienced in the first years of life leaves lasting traces in the construction of sustainable values, attitudes, and behaviors. Therefore, the early promotion of ecological awareness contributes significantly to the consolidation of an environmental culture that transcends generations.

It was also identified that the family, and in particular parents and caregivers, play a determining role in the promotion of children's environmental awareness. The literature shows that when there is coherence between environmental practices at home and school teaching, learning and the internalization of pro-environmental values are reinforced. The active participation of families in school or community programs is a key factor in generating significant behavioral changes in children.

On the other hand, pedagogical strategies based on direct contact with nature, such as field trips, outdoor activities and learning in natural environments, are highly effective in strengthening children's emotional bond with their environment. This emotional connection is crucial to foster a sense of belonging and responsibility towards the environment. In addition, it is recognized that experiential learning favors the development of cognitive, social, and emotional skills within the framework of a holistic education.

The inclusion of artistic, technological, and narrative resources has also been shown to have a positive impact on environmental education. The use of tools such as illustrated stories, mobile applications, digital games, and comics allows teachers to adapt content to the interests and characteristics of children. These innovative methodologies enhance motivation, creativity, and the appropriation of environmental knowledge, especially in urban contexts or contexts with limited biodiversity.

In this sense, the need to redesign early education curricula to incorporate sustainability as a cross-cutting axis is evident. It is imperative that teacher training programs include environmental competencies and active methodologies that allow the integration of care for the environment in all areas of children's learning. Only in this way will it be possible to consolidate quality education that responds to the challenges of climate change, biodiversity loss and the global socio-environmental crisis.

Finally, the systematic review identified gaps in the literature related to intercultural, gender, and socio-emotional approaches in environmental education aimed at children. While much research addresses cognitive and behavioral dimensions, there is still little exploration of how emotions, cultural identities, or social inequalities influence the way children understand and act in the environment. Therefore, it is recommended to continue researching from more integrative and inclusive perspectives, which allow for the construction of contextualized and relevant educational proposals.

REFERENCES

1. Hickman C, Marks E, Pihkala P, Clayton S, Lewandowski RE, Mayall EE, et al. Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey. Lancet Planet Heal. 2021 Dec;5(12):e863–73. https://linkinghub.elsevier.com/retrieve/pii/S2542519621002783

2. WHO. Children's environmental health. World Health Organization. 2021. https://www.who.int/health-topics/children-environmental-health#tab=tab_1

3. UNICEF. The Climate Crisis is a Child Rights Crisis. UNICEF. 2021. https://www.unicef.org/reports/climate-crisis-child-rights-crisis

4. CEP Chile. Encuesta CEP sobre percepción del medio ambiente. Centro de Estudios Públicos. Chile. 2022. https://www.cepchile.cl/

5. Núñez-Hidalgo IA, Rojas-Osorio JA, Alaniz AJ. Chile: Historia medioambiental, perspectivas y desafíos. Rev Geogr Norte Gd. 2019 Dec;(74):249–52. http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-34022019000300249&lng=en&nrm=iso&tlng=en

6. Ipsos Global Advisor. Día de la Tierra 2022. Ipsos Global Advisor. 2022. p. 1–30. https://www.ipsos.com/sites/default/files/ct/news/documents/2022-04/Día de la Tierra 2022-2.pdf

7. Ministerio de Ambiente y Desarrollo Sostenible. Cambio Climático en la Educación Básica. Ministerio de Ambiente y Desarrollo Sostenible. 2022. https://www.minambiente.gov.co/cambio-climatico-y-gestion-del-riesgo/cambio-climatico-en-la-educacion-basica/

8. Bridón LJH, Drago RL. Environmental education activities through the visual arts. Environmental Research and Ecotoxicity 2022;1:24-24. https://doi.org/10.56294/ere202224.

9. Banco Mundial. Informe de desigualdades ambientales en América Latina. World Bank Reports. 2022. https://www.bancomundial.org/es/region/lac/overview

10. Quispe Layme W, Romero Centeno YW, Guillén Ortiz EG. Conciencia ambiental y ecoeficiencia en estudiantes de la escuela profesional de educación de la Universidad Nacional Amazónica de Madre de Dios. Tesis de Licenciatura - Universidad Nacional Amazónica de Madre de Dios; 2024. https://repositorio.unamad.edu.pe/bitstream/handle/20.500.14070/1113/004-1-7-048.pdf?sequence=1&isAllowed=y

11. UNICEF. UNICEF: Estudio revela que el cambio climático afectará de manera decisiva el desarrollo de la niñez y adolescencia en el Perú. UNICEF. 2023. https://www.unicef.org/peru/comunicados-prensa/estudio-revela-cambio-climatico-afectara-manera-decisiva-desarrollo-niñez-adolescencia-peru

12. Quijandria MÁM. Waste classification practices in Peru: An analysis from Villa María del Triunfo and Latin America. Environmental Research and Ecotoxicity 2022;1:16-16. https://doi.org/10.56294/ere202216.

13. MINAM. Gestión de Calidad del Aire. Ministerio del Ambiente. 2024. https://www.minam.gob.pe/calidadambiental/zonas-de-atencion-prioritaria/

14. Mohamed DA, AL Jadidi NAA, AlZmammi RM, Kandeel MM. Merging the Child in Nature: Towards the Greening and Afforestation Project in Light of the Initiatives of Egypt and Saudi Arabia. Int J Educ Math Sci

Technol. 2022 Aug 26;10(4):812–30. https://ijemst.com/index.php/ijemst/article/view/554

15. Heras R, Medir RM, Salazar O. Children's perceptions on the benefits of school nature field trips. Educ 3-13. 2020 May 18;48(4):379–91. https://www.tandfonline.com/doi/full/10.1080/03004279.2019.1610024

16. Preston C. Transgressive Eco-Arts Pedagogy: A response to Kulundu-Bolus, McGarry and Lotz-Sisitka (SAJEE, Volume 36). South African J Environ Educ. 2022 Oct 31;38:107–21. https://www.ajol.info/index.php/sajee/article/view/217160

17. Stock A, Stock O, Mönch J, Suren M, Koch NN, Rey GD, et al. BeeLife: a mobile application to foster environmental awareness in classroom settings. Front Comput Sci. 2024 Jan 3;5. https://www.frontiersin.org/articles/10.3389/fcomp.2023.1298888/full

18. Beaumont ES, Briers E, Harrison E. Slow on the Draw: The Representation of Turtles, Terrapins and Tortoises in Children's Literature. Early Child Educ J. 2019 Nov 8;47(6):743–9. http://link.springer.com/10.1007/s10643-019-00966-0

19. Canosa A, Paquette M-L, Cutter-Mackenzie-Knowles A, Lasczik A, Logan M. Young people's understandings and attitudes towards marine debris: a systematic scoping review. Child Geogr. 2021 Nov 2;19(6):659–76. https://www.tandfonline.com/doi/full/10.1080/14733285.2020.1862759

20. Muldoon R, Shelford T, Holland O, Hryciw DH. Environmental Awareness of Primary School Aged Children in Brisbane, Australia. Int J Innov Sci Math Educ. 2019 Feb 4;27(2). https://openjournals.library.sydney.edu.au/index.php/CAL/article/view/13050

21. Shabani Isenaj Z, Moshammer H, Berisha M, Weitensfelder L. Determinants of Knowledge, Attitudes, Perceptions and Behaviors Regarding Air Pollution in Schoolchildren in Pristina, Kosovo. Children. 2024 Jan 19;11(1):128. https://www.mdpi.com/2227-9067/11/1/128

22. Christodoulou A, Grace M. Becoming 'Wild Citizens': Children's Articulation of Environmental Citizenship in the Context of Biodiversity Loss. Sci Educ. 2025 Jun 30;34(3):969–97. https://link.springer.com/10.1007/s11191-024-00558-4

23. Gilleran Stephens C, Short A, Linnane S. H 2 O Heroes: adding value to an environmental education outreach programme through intergenerational learning. Irish Educ Stud. 2023 Apr 3;42(2):183–204. https://www.tandfonline.com/doi/full/10.1080/03323315.2021.1932549

24. Biber K, Cankorur H, Güler RS, Demir E. Investigation of environmental awareness and attitudes of children attending nature centred private kindergartens and public kindergartens. Aust J Environ Educ. 2023 Mar 3;39(1):4–16. https://www.cambridge.org/core/product/identifier/S0814062622000015/type/journal_article

25. Izadpanah S, Parvaresh P, Şekerci Y. Evaluation of the Architectural Features and Physical Environment in Early Childhood Education Framework. Civ Eng J. 2021 Feb 1;7(2):330–42. https://www.civilejournal.org/index.php/cej/article/view/2584

26. Nasser S, González H. Environmental Planning Strategies for the Sustainability of the Agricultural Sector. Environmental Research and Ecotoxicity 2024;3:114-114. https://doi.org/10.56294/ere2024114.

27. Koutsos TM, Menexes GC, Balampekou EI, Oikonomou A. University students' perception of the factors affecting preschool and primary students' recycling behaviour as a tool to improve environmental education in the university curriculum (Percepción de los estudiantes universitarios de los factores que influ. PsyEcology Biling J Environ Psychol. 2021 May 1;12(2):125–76. https://journals.sagepub.com/doi/10.1080/21711976.2021.1888607

28. Arief NN, Famiola M, Pratama AP, Anggahegari P, Putri ANA. Sustainability Communication through Bio-Based Experiential Learning. Sustainability. 2022 Apr 26;14(9):5204. https://www.mdpi.com/2071-1050/14/9/5204

29. Suárez-Perdomo A, Garcés-Delgado Y, Arvelo-Rosales CN. Systematic review on adolescents' construction of media literacy in educational settings. Rev Educ. 2025 Apr 3;13(1). https://bera-journals.onlinelibrary.wiley.

com/doi/10.1002/rev3.70048

30. Yuxi Bustos JR, Gallegos Vintimilla SH. Prevalencia de serotipos del virus de papiloma humano en mujeres de Ecuador. Rev Salud Vive. 2021 May 4 [cited 2023 Feb 20];4(11):262–87. https://revistavive.org/index.php/revistavive/article/view/110

31. Çetingöz D, Altuğ I, Düzyol Türk E. Sürdürülebilirlik Eğitimi Bakış Açısıyla Okul Öncesi Öğretmenlerinin Çevresel Sanat Etkinlikleri Deneyimleri. Milli Eğitim Derg. 2025 Feb 1;54(245):39–78. http://dergipark.org.tr/tr/doi/10.37669/milliegitim.1520075

32. Lu R-S, Lin H-CK, Yang Y-C, Chen Y-P. Integrating Urban Mining Concepts Through AI-Generated Storytelling and Visuals: Advancing Sustainability Education in Early Childhood. Sustainability. 2024 Dec 23;16(24):11304. https://www.mdpi.com/2071-1050/16/24/11304

33. Hudhana WD, Sumarlam, Sumarwati. Digital Comics of Folktales as Learning Media to Strengthen Elementary School Students' Ecoliteracy. Theory Pract Lang Stud. 2025 Feb 1;15(2):443–51. https://tpls.academypublication.com/index.php/tpls/article/view/9399

34. Gaviria MA. Environmental Education as a Strategy for Ecosystem Conservation: A Bibliometric Analysis of Global Trends. Environmental Research and Ecotoxicity 2025;4:175-175. https://doi.org/10.56294/ere2025175.

35. Garcia X, Domene E, Goenaga X, Rodriguez-Benitez A, Satorras M, Acuña V, et al. Evaluating the effectiveness of a serious game to educate children about the urban water cycle. Br J Educ Technol. 2025 Feb 14; https://bera-journals.onlinelibrary.wiley.com/doi/10.1111/bjet.13578

36. Iwasaki S. Effects of Environmental Education on Young Children's Water-Saving Behaviors in Japan. Sustainability. 2022 Mar 14;14(6):3382. https://www.mdpi.com/2071-1050/14/6/3382

37. Aurélio L, França S, Sequeira V, Boaventura D, Correia MJ, Pinto B, et al. Tell a Story to Save a River: Assessing the Impact of Using a Children's Book in the Classroom as a Tool to Promote Environmental Awareness. Front Mar Sci. 2021 Jul 22;8. https://www.frontiersin.org/articles/10.3389/fmars.2021.699122/full

38. Wolfenson ED, Bustos CA. The invisible threat: micro- and nanoplastics in ecosystems and human bodies. Environmental Research and Ecotoxicity 2024;3:110-110. https://doi.org/10.56294/ere2024110.

39. Arabaci M, Okyay O. The effect of shared book reading on preschoolers' environmental awareness and attitudes. Educ 3-13. 2023 May 19;51(4):571–83. https://www.tandfonline.com/doi/full/10.1080/03004279.2021.1990371

40. HUANG Y, KENNEDY C. Bloom and Grow: Creating an Illustrated Book and Learning Games on Native Plants for Children. Landsc Archit Front. 2023;11(6):82. https://journal.hep.com.cn/laf/EN/10.15302/J-LAF-1-050057

41. Nurhayani I. Humans and animal welfare in the Adventures of the Mouse-deer : an ecological discourse analysis. Cogent Arts Humanit. 2024 Dec 31;11(1). https://www.tandfonline.com/doi/full/10.1080/23311983.2024.2316412

42. Pomer J. Dance the moving world. J Danc Somat Pract. 2021 Dec 1;13(1):207–15. https://intellectdiscover.com/content/journals/10.1386/jdsp_00049_1

43. Kanaki K, Chatzakis S, Kalogiannakis M. Fostering Algorithmic Thinking and Environmental Awareness via Bee-Bot Activities in Early Childhood Education. Sustainability. 2025 May 7;17(9):4208. https://www.mdpi.com/2071-1050/17/9/4208

44. Sezer Balci A, Öğüt Düzen K, Yalçın V. Effectiveness of Social Learning Theory Based Ecological Footprint Awareness Program in 60-72-Month-Old Children: A Randomized Controlled Study. Child Indic Res. 2025 Feb 9;18(1):199–216. https://link.springer.com/10.1007/s12187-024-10185-8

45. Sihvonen P, Lappalainen R, Herranen J, Aksela M. Promoting Sustainability Together with Parents in Early Childhood Education. Educ Sci. 2024 May 16;14(5):541. https://www.mdpi.com/2227-7102/14/5/541

46. Seemüller S, Beck F, Tristram C, Marzi I, Renninger D, Demetriou Y, et al. The role of parental environmental self-identity in active travel behavior within parent–adolescent dyads. Ger J Exerc Sport Res. 2024 Mar 13;54(1):135–44. https://link.springer.com/10.1007/s12662-023-00923-5

47. Novikova E, Gallo-Fox J. Maintaining family engagement during the initial months of COVID-19 in an early childhood nature program. J Outdoor Environ Educ. 2025 Apr 25;28(1):131–53. https://link.springer.com/10.1007/s42322-024-00159-3

48. Alanazi FH, Alrwaili DR. The Reality of Early Childhood Teachers' Practice of Their Roles in Spreading Environmental Awareness in Saudi Arabia. Int J Environ Impacts. 2024 Dec 31;7(4):693–704. https://www.iieta.org/journals/ijei/paper/10.18280/ijei.070410

49. Miyasaka M, Honda S. Planning and management of environmental education to promote educator's environmental awareness and pro-environmental behaviour. Discov Educ. 2024 Nov 1;3(1):204. https://link.springer.com/10.1007/s44217-024-00322-4

50. Ma J. Promoting the formation of environmental awareness in children: the representation of nature in Chinese language textbooks. J World Lang. 2024 Aug 27;10(2):456–85. https://www.degruyter.com/document/doi/10.1515/jwl-2023-0024/html

51. Sekulova F, Mallén IR. The governance configurations of green schoolyards. Environ Sci Policy. 2024 Jun;156:103752. https://linkinghub.elsevier.com/retrieve/pii/S1462901124000868

52. Küpeli K, Bayındır D. Preschool outdoor education environment quality predicts children's environmental attitude, awareness and affinity towards nature (biophilia). Early Years. 2025 Jan 2;1–15. https://www.tandfonline.com/doi/full/10.1080/09575146.2024.2444886

53. Ural E. Exploring nature perceptions of children aged between 9–12 through their drawings in the context of today, living place, and future. J Outdoor Environ Educ. 2025 May 22; https://link.springer.com/10.1007/s42322-025-00212-9

54. Arbor RN, Matteson K. Interdisciplinary nature journaling improves mood and helps build connection in middle school students. Environ Educ Res. 2025 Apr 3;31(4):748–58. https://www.tandfonline.com/doi/full/10.1080/13504622.2024.2405901

55. Bridón LJH, Drago RL. Environmental education and art: visual arts as a tool for ecological education in primary schools in Cuba. Environmental Research and Ecotoxicity 2023;2:83-83. https://doi.org/10.56294/ere202383.

56. Berasategi Sancho N, Eiguren Munitis A, Legorburu Fernandez IL, Idoiaga-Mondragon NI. Children's Active and Autonomous School Journeys and Their Implications: An Investigation Using Drawing Methodology. Child Youth Care Forum. 2025 May 23; https://link.springer.com/10.1007/s10566-025-09867-3

57. Faganel A, Kovač B. Inquiring and strengthening the environmental awareness among elementary school children. Int J Innov Learn. 2025;37(4):439–73. http://www.inderscience.com/link.php?id=146510

58. Dabaja ZF. Reviewing two decades of research on the Forest School impact on children: The sequel. Educ 3-13. 2022 Aug 18;50(6):737–50. https://www.tandfonline.com/doi/full/10.1080/03004279.2021.1905019

59. Farra CG, Bates BR. A culture-centered, arts-based approach to defining "quality education" in a rural Ecuadorian community. Commun Q. 2025 Apr 22;1–24. https://www.tandfonline.com/doi/full/10.1080/01463373.2025.2495296

60. Contreras Ameduri C. Avian Ecopedagogies: Women Ornithologists and Environmental Education in Late Nineteenth-Century America. Rev Alicant Estud Ingleses. 2025 Jan 30;(42):73–94. https://raei.ua.es/article/view/25702

61. Talebpour LM, Busk PL, Heimlich JE, Ardoin NM. Children's connection to nature as fostered through residential environmental education programs: Key variables explored through surveys and field journals. Environ Educ Res. 2020 Jan 2;26(1):95–114. https://www.tandfonline.com/doi/full/10.1080/13504622.2019.

1707778

62. Beauchamp A-A, Lacoste Y, Kingsbury C, Gadais T. When are you taking us outside? An exploratory study of the integration of the outdoor learning in preschool and primary education in Quebec. Front Psychol. 2022 Oct 20;13. https://www.frontiersin.org/articles/10.3389/fpsyg.2022.955549/full

63. Wold P-A, Melis C, Bjørgen K, Moe B, Billing AM. Norwegian preschool children´s knowledge about some common wild animal species and their habitats. Cogent Educ. 2023 Dec 11;10(2). https://www.tandfonline.com/doi/full/10.1080/2331186X.2023.2259513

64. Yfantidou G, Kouli O, Morela E, Kouli E. Enhancing Environmental Awareness in Tourism Through Movement: A Physical Education Approach. Educ Sci. 2025 Feb 27;15(3):297. https://www.mdpi.com/2227-7102/15/3/297

65. Deng H, Ismail MA, Sulaiman R. Exploring the Impact of Biophilic Design Interventions on Children's Engagement with Natural Elements. Sustainability. 2025 Mar 31;17(7):3077. https://www.mdpi.com/2071-1050/17/7/3077

66. Howe AG, Nguyen TTT, O'Connor P, Woodward A, Clarke S, Ducker N, et al. Catching 'the bug': Investigating insects through school-based citizen science increases intentions for environmental activities in students and teachers. Austral Entomol. 2025 May 18;64(2). https://onlinelibrary.wiley.com/doi/10.1111/aen.70004

67. Xie Y, Lin B. Understanding the dynamic changes in public support for waste incineration power plants in China's first-tier cities. Renew Energy. 2025 Jul;247:123064. https://linkinghub.elsevier.com/retrieve/pii/S0960148125007268

68. Roma R, Tardif-Williams C, Bosacki S. 'Because they are a part of life:' Children's ideas about the welfare, rights, and protection of animals and ecosystems. J Moral Educ. 2023 Oct 2;52(4):511–25. https://www.tandfonline.com/doi/full/10.1080/03057240.2023.2176835

69. Stanisic J, Maksic S, Nenadic F. Predictors of environmental awareness among primary school students in Serbia. Zb Instituta za Pedagos Istraz. 2023;55(1):51–72. https://doiserbia.nb.rs/Article.aspx?ID=0579-64312301051S

70. Thapa JD. Spreading Environmental Awareness Through Environmental Education in Schools: The Case Study of a Sikkimese Green School. Asian J Leg Educ. 2021 Jul 21;8(2):234–46. https://journals.sagepub.com/doi/10.1177/2322005820985574

71. Thor D, Karlsudd P. Teaching and Fostering an Active Environmental Awareness Design, Validation and Planning for Action-Oriented Environmental Education. Sustainability. 2020 Apr 16;12(8):3209. https://www.mdpi.com/2071-1050/12/8/3209

72. Ye Y-H, Shih Y-H. Environmental Education for Children in Taiwan: Importance, Purpose and Teaching Methods. Univers J Educ Res. 2020 Apr;8(4):1572–8. http://www.hrpub.org/journals/article_info.php?aid=9100

73. Simsar A. Young Children's Ecological Footprint Awareness and Environmental Attitudes in Turkey. Child Indic Res. 2021 Aug 13;14(4):1387–413. https://link.springer.com/10.1007/s12187-021-09810-7

74. Soares J, Miguel I, Venâncio C, Lopes I, Oliveira M. On the path to minimize plastic pollution: The perceived importance of education and knowledge dissemination strategies. Mar Pollut Bull. 2021 Oct;171:112890. https://linkinghub.elsevier.com/retrieve/pii/S0025326X21009243

75. Rocher M, Silva B, Cruz G, Bentes R, Lloret J, Inglés E. Benefits of Outdoor Sports in Blue Spaces. The Case of School Nautical Activities in Viana do Castelo. Int J Environ Res Public Health. 2020 Nov 16;17(22):8470. https://www.mdpi.com/1660-4601/17/22/8470

76. OKYAY Ö, SAYIN A, GUNES DEMIR Z, ÖZDEMİR K. Ekolojik Okuryazarlık Eğitiminin Okul Öncesi Çocukların Çevreye Yönelik Farkındalık ve Tutumlarına Etkisi. Milli Eğitim Derg. 2022 Nov 11;51(236):2851–70. http://dergipark.org.tr/tr/doi/10.37669/milliegitim.944271

77. Iwaniec J, Curdt-Christiansen XL. Parents as Agents: Engaging Children in Environmental Literacy in

China. Sustainability. 2020 Aug 14;12(16):6605. https://www.mdpi.com/2071-1050/12/16/6605

78. Khajanchi Y, Swadimath UC, Dudi M, Singh S. A systematic review of early childhood environmental learning and its relationship with family socioeconomic status. Multidiscip Rev. 2024 Mar 25;6:2023ss033. https://malque.pub/ojs/index.php/mr/article/view/2950

79. GÜVENİR Z, TÜRKMEN L. The examination of preschool children's environmental attitudes and awareness. J Turkish Sci Educ. 2024 Sep 25;21(3):430–47. https://www.tused.org/index.php/tused/article/view/2872

80. Yang B, Wu N, Tong Z, Sun Y. Narrative-Based Environmental Education Improves Environmental Awareness and Environmental Attitudes in Children Aged 6–8. Int J Environ Res Public Health. 2022 May 26;19(11):6483. https://www.mdpi.com/1660-4601/19/11/6483

81. Scholz F, Börner N, Schust SA, Schardey J, Kühn F, Renz B, et al. Focus on patient perspectives in climate action policies for healthcare. A German survey analysis on what patients are willing to do. Front Public Heal. 2024 Nov 26;12. https://www.frontiersin.org/articles/10.3389/fpubh.2024.1477313/full

82. Yen TTK, Huyen NT, Hien NV, Phuc D Van. Research on Factors of Fun Activities Affecting the Sustainable Environmental Behaviour of Preschoolers (From 3 to 6 Years Old). WSEAS Trans Environ Dev. 2023 Feb 7;19:89–97. https://wseas.com/journals/ead/2023/a165115-949.pdf

83. Ghosh A, Patra S, Bhattacharjee S, Bera B. Severe magnitude of dental and skeletal fluorosis and its impact on society and environment in a part of Manbhum-Singhbhum Plateau, India. BMC Public Health. 2024 Jul 23;24(1):1971. https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-024-19446-1

84. Jokela-Pansini M, Militz E. Breathing new futures in polluted environments (Taranto, Italy). Trans Inst Br Geogr. 2022 Sep 24;47(3):741–55. https://rgs-ibg.onlinelibrary.wiley.com/doi/10.1111/tran.12532

85. ERBAY F, AMCA TOKLU D, KUSET Ş, SIDDIK H. Comparison of Pre-School Education Curricula of Turkish Republic of Northern Cyprus (TRNC), England, Finland, Southern Cyprus and India. Particip Educ Res. 2021 Aug 1;8(3):385–401. http://dergipark.org.tr/en/doi/10.17275/per.21.72.8.3

86. Curdt-Christiansen XL. Environmental literacy: raising awareness through Chinese primary education textbooks. Lang Cult Curric. 2021 Apr 3;34(2):147–62. https://www.tandfonline.com/doi/full/10.1080/07908318.2020.1797078

87. Sakarya S, Güney M, Akıncı Demirbaş E, Çakmak A. University students' awareness profile on environmental sensitivity and global climate change. Environ Dev Sustain. 2023 Oct 23;27(2):3103–23. https://link.springer.com/10.1007/s10668-023-04003-4

FINANCING

None.

CONFLICT OF INTEREST

None.

AUTHORSHIP CONTRIBUTION:

Conceptualization: María Aquije-Mansilla.
Data curation: María Aquije-Mansilla.
Formal analysis: María Aquije-Mansilla.
Research: María Aquije-Mansilla.
Methodology: María Aquije-Mansilla.
Project management: María Aquije-Mansilla.
Resources: María Aquije-Mansilla.
Software: María Aquije-Mansilla.
Supervision: María Aquije-Mansilla.
Validation: María Aquije-Mansilla.
Display: María Aquije-Mansilla
Drafting - original draft: María Aquije-Mansilla.
Writing - proofreading and editing: María Aquije-Mansilla.