
Environmental awareness and sustainability in contemporary educational processes for citizen formation

Conciencia ambiental y sostenibilidad en los procesos educativos contemporáneos para la formación ciudadana

Consciência ambiental e sustentabilidade nos processos educativos contemporâneos para a formação cidadã

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Abstract

Environmental awareness in contemporary educational processes represents a fundamental element for promoting sustainable societies and citizens committed to protecting the natural environment. The objective of this article was to analyze the foundations, pedagogical strategies, and impacts of environmental education on strengthening pro-environmental attitudes and behaviors. The research was conducted using a qualitative descriptive-analytical approach through a documentary review of scientific literature related to environmental education, sustainability, and civic education. For the analysis, categories associated with interdisciplinary approaches, human-nature relationships, environmental values formation, active methodologies, and transversal curricular integration were identified. The results showed that participatory pedagogical strategies, such as project-based learning and practical experiences, promoted the development of critical thinking, ecological awareness, and student participation in sustainable actions. Likewise, curricular transversalization was identified as a key factor in strengthening the incorporation of sustainability across different educational levels. It was concluded that environmental education constitutes a strategic tool for promoting social and environmental responsibility, strengthening the construction of an ecological culture oriented toward sustainable development and citizen commitment to contemporary environmental challenges.

Keywords: environmental awareness, environmental education, sustainability, learning.

Resumen

La conciencia ambiental en los procesos educativos contemporáneos representa un elemento fundamental para promover sociedades sostenibles y ciudadanos comprometidos con la protección del entorno natural. El objetivo de este artículo fue analizar los fundamentos, estrategias pedagógicas e impactos de la educación ambiental en el fortalecimiento de actitudes y comportamientos proambientales. La investigación se desarrolló desde un enfoque cualitativo con carácter descriptivo-analítico, mediante una revisión documental de literatura

científica relacionada con educación ambiental, sostenibilidad y formación ciudadana. Para el análisis se identificaron categorías vinculadas con enfoques interdisciplinarios, relación ser humano-naturaleza, formación en valores ambientales, metodologías activas e integración curricular transversal. Los resultados evidenciaron que las estrategias pedagógicas participativas, como el aprendizaje basado en proyectos y las experiencias prácticas, favorecieron el desarrollo del pensamiento crítico, la sensibilización ecológica y la participación estudiantil en acciones sostenibles. Asimismo, se identificó que la transversalidad curricular fortalece la incorporación de la sostenibilidad en los diferentes niveles educativos. Se concluyó que la educación ambiental constituye una herramienta estratégica para promover responsabilidad social y ambiental, fortaleciendo la construcción de una cultura ecológica orientada al desarrollo sostenible y al compromiso ciudadano frente a los desafíos ambientales contemporáneos.

Palabras clave: conciencia ambiental, educación ambiental, sostenibilidad, aprendizaje.

Resumo

A consciência ambiental nos processos educativos contemporâneos representa um elemento fundamental para promover sociedades sustentáveis e cidadãos comprometidos com a proteção do meio ambiente. O objetivo deste artigo foi analisar os fundamentos, as estratégias pedagógicas e os impactos da educação ambiental no fortalecimento de atitudes e comportamentos pró-ambientais. A pesquisa foi desenvolvida a partir de uma abordagem qualitativa de caráter descritivo-analítico, mediante revisão documental de literatura científica relacionada à educação ambiental, sustentabilidade e formação cidadã. Para a análise, foram identificadas categorias vinculadas às abordagens interdisciplinares, relação ser humano-natureza, formação de valores ambientais, metodologias ativas e integração curricular transversal. Os resultados evidenciaram que as estratégias pedagógicas participativas, como a aprendizagem baseada em projetos e as experiências práticas, favoreceram o desenvolvimento do pensamento crítico, da sensibilização ecológica e da participação estudiantil em ações sustentáveis. Além disso, identificou-se que a transversalidade curricular fortalece a incorporação da sustentabilidade nos diferentes níveis educacionais. Concluiu-se que a educação ambiental constitui uma ferramenta estratégica para promover responsabilidade social e ambiental, fortalecendo a construção de uma cultura ecológica orientada ao desenvolvimento sustentável e ao compromisso cidadão diante dos desafios ambientais contemporâneos.

Palavras-chave: consciência ambiental, educação ambiental, sustentabilidade, aprendizagem.

Introduction

Contemporary environmental issues constitute one of the greatest challenges facing humanity due to the effects of climate change, pollution, and the progressive deterioration of ecosystems. These problems not only affect natural balance but also the social, economic, and cultural conditions of populations. In this context, education acquires a strategic role by promoting knowledge, values, and practices aimed at environmental protection. According to Valencia Hernández et al. (2015), environmental challenges linked to climate change generate profound social consequences, including human displacement and difficulties in accessing environmental justice, highlighting the need to strengthen civic education through educational settings.

Currently, educational institutions face the challenge of integrating pedagogical processes that enable understanding the complexity of the environmental crisis and encourage responsible responses to it. Changes in consumption patterns, the indiscriminate exploitation of natural resources, and the increase in extreme climate events demand new educational perspectives

centered on sustainability. In this regard, Delgado Serrano et al. (2014) argue that environmental and social challenges associated with climate change require structural transformations involving both public policies and educational processes capable of generating awareness and social participation.

Environmental awareness can be understood as individuals' capacity to recognize ecological problems, critically reflect on them, and adopt responsible behaviors aimed at environmental care. This concept involves not only theoretical knowledge but also attitudes and values that promote sustainability and collective commitment. According to Yupanqui-Guevara and Leyva-Aguilar (2024), environmental literacy constitutes a fundamental tool for empowering individuals and promoting significant changes in their daily practices, thereby strengthening social responsibility toward contemporary ecological problems.

Likewise, the development of environmental awareness is closely related to critical thinking, as it allows the analysis of the causes and consequences of environmental issues from a reflective and interdisciplinary perspective. In this context, Portocarrero Gutiérrez et al. (2021) emphasize that environmental education must go beyond the mere transmission of ecological content and focus on training individuals capable of questioning practices harmful to the environment and proposing sustainable solutions through collective and participatory action. This perspective can be further enriched by recent theoretical developments in environmental humanities.

In order to deepen the conceptual understanding of environmental awareness within educational processes, this study is further grounded in contemporary ecocritical and new materialist perspectives. Third-wave ecocriticism, as developed by Serenella Iovino and Serpil Oppermann (2014), shifts the focus from representational analyses of nature toward the material entanglements between human and non-human agents, emphasizing the agency of matter and the ethical implications of these interrelations. Complementing this view, new materialist thinkers such as Jane Bennett (2010) and Stacy Alaimo (2010) challenge anthropocentric frameworks by foregrounding the vitality of non-human matter and the transcorporeal connections between bodies and environments. From this perspective, environmental education can be reinterpreted not merely as the transmission of ecological knowledge or values, but as a transformative process that reconfigures subjectivity through relational, embodied, and material engagements with the more-than-human world. Such a framework enables a more nuanced understanding of how environmental awareness is formed, linking cognitive, ethical, and affective dimensions within contemporary educational practices.

Furthermore, young people's environmental attitudes represent a key element in understanding how new generations perceive current ecological challenges. Research conducted by Vázquez and Manassero (2005) demonstrates that educational experiences significantly influence the construction of environmental values and behaviors. Consequently, schools become essential spaces for strengthening responsible habits and promoting a culture of respect for the natural environment through participatory methodologies and contextualized experiences.

The incorporation of environmental education into contemporary educational processes responds to the need to train citizens committed to sustainable development and the preservation of natural resources. From this perspective, education should not be limited to the teaching of conceptual content but should also promote competencies that enable ethical and responsible action in response to environmental problems. Espinoza Coronel (2023) states that environmental education plays a fundamental role in training conscious citizens capable of assuming individual and collective responsibilities aimed at social and ecological well-being.

In addition, sustainability in educational processes implies integrating pedagogical practices that strengthen the social and environmental commitment of future professionals and teachers. In this regard, García-Ceballos et al. (2021) argue that educational training oriented

toward sustainability fosters the development of future responsible practices committed to preserving natural and cultural heritage. Therefore, it is essential for educational systems to integrate environmental education transversally into the curriculum, promoting active participation, critical thinking, and the construction of more sustainable societies.

Despite the growing body of research on environmental education and sustainability, the literature remains largely fragmented across pedagogical, ethical, and civic dimensions. Existing studies tend to focus either on the development of environmental awareness or on the implementation of specific teaching methodologies, without sufficiently integrating these elements into a coherent framework that connects environmental values formation, participatory pedagogies, and citizen development. Moreover, limited attention has been given to how interdisciplinary and transversal approaches can systematically contribute to the construction of pro-environmental behaviors within contemporary educational processes. This gap highlights the need for a more comprehensive analytical perspective that articulates environmental education not only as a field of knowledge, but as a transformative process shaping ecological consciousness and responsible citizenship. In response to this need, the present study seeks to examine the theoretical foundations, pedagogical strategies, and educational impacts that underpin the formation of environmentally responsible citizens. Thus, this article contributes to the field by proposing an integrative reading of environmental education as a multidimensional process linking awareness, values, and civic engagement.

Methodology

This research was developed using a qualitative approach with a descriptive-analytical scope, aimed at understanding the relevance of environmental awareness in contemporary educational processes. This approach allowed for a reflective interpretation of the theoretical and pedagogical contributions related to environmental education and its impact on the formation of citizens committed to sustainability. According to Portilla Chaves et al. (2014), qualitative research makes it possible to understand educational phenomena as complex social facts, considering the interpretations, experiences, and meanings constructed within educational and cultural contexts.

The study was based on the interpretative paradigm, as it sought to analyze different conceptual perspectives on environmental awareness and educational strategies linked to sustainability. In this sense, qualitative research favored the critical analysis of academic discourses and pedagogical practices related to environmental education. According to Loayza-Maturrano (2020), this type of methodology is particularly relevant in the Human and Educational Sciences because it allows for a deeper understanding of social phenomena through processes of interpretation, contextual analysis, and theoretical construction based on collected information.

Documentary review was used as the main data collection technique, allowing the examination of scientific articles, books, and academic publications related to environmental awareness, sustainability, and contemporary educational processes. Sources were selected according to criteria of thematic relevance, timeliness, and scientific rigor, prioritizing indexed research and studies relevant to the development of the analysis. In this regard, Cerrón Rojas (2019) argues that qualitative research in education promotes a comprehensive understanding of phenomena through the systematic analysis of theoretical and documentary information derived from different contexts and research perspectives.

The analysis procedure consisted of identifying, classifying, and interpreting the main approaches, strategies, and pedagogical practices aimed at strengthening environmental awareness in educational settings. Subsequently, the collected information was organized into thematic categories related to sustainability, civic education, critical thinking, and transversal environmental education. This process made it possible to establish relationships among the various theoretical contributions reviewed and to construct an analytical interpretation of the studied phenomenon. In this framework, Osses Bustingorry et al. (2006) affirm that

qualitative research in education facilitates knowledge generation through analytical and interpretative processes that contribute to understanding the complexity of educational phenomena.

Literature review

Foundations of environmental education

Environmental education emerged as a pedagogical response to ecological and social problems resulting from the inadequate relationship between human activities and the natural environment. Its primary purpose is to promote knowledge, values, and attitudes aimed at environmental protection and the strengthening of sustainable practices within society. In this regard, Richard (2004) argues that environmental education should be understood as a permanent training process that enables individuals to understand the complexity of ecosystems and assume responsibilities toward the conservation of natural resources.

Interdisciplinary approach

The interdisciplinary nature of environmental education constitutes one of its essential foundations because ecological problems involve social, economic, cultural, and scientific dimensions that must be addressed comprehensively. Pollution, climate change, and biodiversity loss cannot be analyzed from a single discipline but rather through the articulation of different fields of knowledge. According to Nay-Valero and Cordero-Briceño (2019), environmental education and education for sustainability have evolved toward multidisciplinary approaches integrating scientific, ethical, and social aspects aimed at building sustainable societies.

Likewise, the interdisciplinary approach promotes the understanding of environmental phenomena from critical and contextualized perspectives. The integration of areas such as biology, sociology, economics, and pedagogy allows for a broader analysis of the causes and consequences of contemporary ecological problems. Within this framework, Hernández Montaña (2006) states that environmental education should promote training processes capable of connecting theoretical knowledge with practical experiences, thereby strengthening critical awareness and students' active participation in solving environmental problems.

Interdisciplinarity also contributes to the development of civic competencies related to critical thinking and responsible decision-making. Through participatory and reflective methodologies, students can understand how human actions influence environmental deterioration and what alternatives may be implemented to mitigate their effects. Consequently, environmental education is consolidated as a transformative educational process that promotes cultural and social changes oriented toward sustainability and the preservation of ecological balance.

Human-nature relationship

The relationship between human beings and nature has been the subject of multiple analyses due to the need to rethink prevailing development models and their impacts on the environment. Historically, societies have maintained diverse links with the natural environment, evolving from relationships of balance and dependence to practices involving the intensive exploitation of natural resources. According to Rodríguez and Quintanilla (2019), understanding this relationship implies recognizing the constant interaction between human development, adaptability, and well-being while considering both social needs and environmental conservation.

From a philosophical and scientific perspective, the human-nature relationship has also generated debates regarding the concept of sustainable development and the limits of economic growth. Lugo-Morin et al. (2015) argue that sustainability requires an integrative vision recognizing the interdependence between social and ecological systems, promoting responsible practices that ensure the permanence of natural resources for future generations.

On the other hand, urban spaces also represent relevant scenarios for strengthening the connection between people and nature. Urban agriculture, community projects, and conservation initiatives allow the development of educational experiences aimed at valuing the environment and promoting civic participation. In this context, Torres et al. (2016) highlight that urban practices linked to environmental conservation contribute to strengthening ecological awareness and constructing more balanced relationships between society and nature.

Environmental values formation

The formation of environmental values constitutes an essential component of environmental education, as it seeks to develop ethical and responsible attitudes toward the natural environment. Values such as respect, solidarity, responsibility, and ecological commitment strengthen behaviors aimed at environmental protection and the sustainable use of natural resources. According to González-Alberteris and Rojas-Sánchez (2023), the formation of environmental values among university students promotes the construction of a sustainable culture based on active participation and collective responsibility.

Environmental values education can also be understood from ecological approaches that analyze the influence of different social contexts on human development. In this regard, Perea Ortiz (2024) highlights the influence of Bronfenbrenner's ecological theory on the formation of environmental values, noting that factors such as family, school, and community play a determining role in shaping responsible environmental behaviors.

The family constitutes one of the primary socialization spaces for forming values related to environmental care. Daily practices, consumption habits, and parents' attitudes significantly influence children's and adolescents' perceptions of nature and sustainability. Within this framework, Conopoima Moreno (2021) argues that the family environment contributes decisively to strengthening environmental values through educational experiences that promote respect and ecological responsibility from an early age.

Pedagogical strategies for environmental awareness

Pedagogical strategies aimed at strengthening environmental awareness seek to promote meaningful learning that enables students to understand ecological problems and actively participate in the search for sustainable solutions. These strategies integrate innovative, participatory, and contextualized methodologies that encourage the development of critical thinking and social responsibility toward the environment.

Project-based learning

Project-based learning represents one of the most relevant methodologies for environmental education because of its ability to connect academic content with real social and ecological problems. Through this strategy, students develop research projects, proposals, and actions aimed at solving issues related to environmental care and sustainability. According to Ayerbe López and Perales Palacios (2025), project-based learning generates a positive impact on environmental awareness by encouraging active participation and critical reflection on ecological problems.

Moreover, this methodology strengthens competencies such as collaborative work, decision-making, and environmental problem-solving. Through practical activities and interdisciplinary projects, students can relate theory to concrete experiences aimed at improving their environment. In this context, Guachichulca Barrera et al. (2024) point out that project-based learning constitutes an effective means of promoting environmental education among elementary school students through meaningful and contextualized experiences.

Practical activities and direct experiences

Practical activities and direct experiences encourage experiential learning that strengthens students' connection with the natural environment. Field trips, school gardens, ecological

campaigns, and community activities enable students to concretely understand environmental problems and their possible solutions. According to Trujillo Oñate (2024), pedagogical strategies based on practical experiences significantly contribute to the development of environmental awareness oriented toward sustainability and responsible participation.

These experiences also promote environmental sensitivity and the strengthening of values related to nature conservation. By becoming directly involved in ecological activities, students develop greater commitment and responsibility toward environmental care. In this sense, Mauris De la Ossa et al. (2025) highlight that pedagogical strategies implemented in Latin America promote environmental education through active experiences and participatory processes among elementary and middle school students.

Transversal curricular integration

Transversal curricular integration constitutes a fundamental strategy for incorporating environmental education into different educational levels and subject areas. This approach allows sustainability to be addressed in an articulated manner in subjects such as natural sciences, social studies, language, and ethics education, thereby promoting comprehensive education. According to Garzón Guerra and Acuña Beltrán (2016), transversal projects facilitate civic education and the strengthening of competencies related to coexistence, social responsibility, and community participation.

Curricular transversality also promotes the construction of an institutional culture committed to sustainability and environmental care. Through educational policies, school projects, and integrated pedagogical practices, institutions can strengthen the ecological commitment of students and teachers. In this context, Caicedo Bayona et al. (2025) argue that education for sustainability requires transversal integration that promotes pedagogical practices oriented toward sustainable development and environmental awareness.

Impact on student behavior

Environmental education significantly influences student behavior by promoting attitudes, values, and practices related to sustainability and environmental care. Educational processes focused on environmental awareness strengthen social participation and students' commitment to contemporary ecological issues. In this regard, environmental education not only contributes to the acquisition of theoretical knowledge but also encourages the development of responsible behaviors and ethical commitment toward environmental preservation.

Development of pro-environmental attitudes

Pro-environmental attitudes represent favorable dispositions toward environmental protection and the adoption of sustainable behaviors in everyday life. These attitudes are developed through educational experiences that strengthen ecological knowledge and environmental sensitivity. According to Andrade Salazar and Gonzales Portillo (2019), there is a significant relationship between ecological knowledge and adolescents' pro-environmental attitudes, demonstrating the importance of education in the formation of responsible behaviors toward the environment.

Likewise, environmental awareness among secondary school students contributes to strengthening sustainable practices and the development of ecological values. Estrada Araoz et al. (2022) state that environmental awareness positively influences students' pro-environmental attitudes, encouraging behaviors related to recycling, resource conservation, and ecosystem protection. These findings confirm that environmental education can generate meaningful changes in students' perceptions and behaviors toward environmental conservation.

In addition, the development of pro-environmental attitudes is closely linked to educational contexts that promote participation, reflection, and direct interaction with the environment.

Educational institutions that implement environmental projects and participatory strategies foster greater ecological commitment among students. Therefore, the strengthening of environmental awareness through pedagogical practices contributes not only to academic learning but also to the formation of citizens capable of making responsible decisions regarding environmental sustainability.

Participation in sustainable actions

Student participation in sustainable actions constitutes a practical manifestation of the environmental awareness developed within educational processes. Ecological campaigns, community projects, recycling programs, and conservation activities strengthen civic commitment and social responsibility toward the environment. According to Meadowcroft (2003), social participation represents an essential element for achieving sustainable development because it promotes the collective construction of solutions to environmental problems.

Similarly, citizen participation strengthens inclusive processes aimed at improving communities' social and environmental conditions. Cedrés (2012) emphasizes that the construction of sustainable and inclusive habitats requires the active involvement of citizens in planning and implementing actions aimed at collective well-being and environmental sustainability. In the educational field, these participatory experiences allow students to recognize their role as agents of change capable of contributing to environmental improvement within their communities.

Furthermore, participation in sustainable actions fosters collaborative work, leadership, and civic responsibility among students. Educational initiatives focused on environmental sustainability encourage collective commitment and strengthen relationships between schools and communities. Consequently, active participation in ecological projects contributes to the consolidation of democratic values and environmental responsibility, promoting a culture of sustainability within educational institutions and society in general.

Social and environmental responsibility

Social and environmental responsibility implies the ethical commitment of institutions and individuals to environmental protection and social well-being. In the educational field, this principle promotes practices aimed at sustainability and the formation of responsible citizens. According to Pérez Espinoza et al. (2016), social responsibility with an environmental focus encourages a sustainable vision based on the balance between economic development, ecological protection, and social welfare.

Within educational institutions, environmental responsibility is reflected in the implementation of policies, projects, and actions aimed at promoting sustainable practices and ecological awareness. Schools and universities play a fundamental role in strengthening environmental ethics through programs that encourage recycling, responsible consumption, energy conservation, and respect for biodiversity. In this sense, educational processes oriented toward sustainability contribute to shaping citizens capable of responding ethically and responsibly to current environmental challenges.

In the university context, social responsibility also involves promoting academic and community projects focused on environmental care and social transformation. In this regard, Torres Maya and Verdecia Marín (2021) argue that university social responsibility strengthens students' ethical, aesthetic, and environmental education by promoting an institutional culture committed to sustainability and integral human development. Therefore, environmental responsibility in education becomes a strategic element for consolidating sustainable societies based on participation, solidarity, and ecological commitment.

Discussion

Environmental awareness in contemporary educational processes represents an essential component for addressing ecological and social challenges resulting from climate change and environmental degradation. The reviewed theoretical findings demonstrate that environmental education should not be limited to the transmission of knowledge about the environment but should instead focus on the comprehensive formation of citizens capable of acting responsibly and sustainably. In this sense, Nay-Valero and Cordero-Briceño (2019) argue that education for sustainability requires interdisciplinary approaches that allow understanding environmental problems from scientific, social, and ethical dimensions. This perspective aligns with the need to strengthen critical and participatory educational processes that promote cultural changes oriented toward sustainability. This shift from knowledge transmission to a more relational understanding of environmental awareness resonates with the idea that matter itself possesses a certain vitality, as Jane Bennett argues, "*matter is not passive stuff but a lively and self-organizing force*" (Bennett, 2010, p. 117), thus calling for educational approaches that recognize the dynamic interactions between humans and their environments.

Likewise, the documentary review made it possible to identify that the relationship between human beings and nature constitutes a central axis in the construction of environmental awareness. The analyzed studies emphasize that traditional development models have promoted practices involving the indiscriminate exploitation of natural resources, generating ecological and social imbalances. According to Rodríguez and Quintanilla (2019), human well-being depends on the ability to establish balanced relationships with the natural environment by promoting sustainable forms of adaptation and coexistence. From this perspective, environmental education becomes relevant because it contributes to the construction of new forms of thinking aimed at environmental protection and responsible development. In this context, the human-nature relationship can be reinterpreted as a form of material interconnection rather than separation, echoing Stacy Alaimo's notion that "*the environment is not located somewhere out there, but is always the very substance of ourselves*" (Alaimo, 2010, p. 2).

Another relevant aspect identified in the analysis concerns the formation of environmental values as an indispensable element for strengthening pro-environmental behaviors. The reviewed evidence demonstrates that ecological awareness is not developed solely through the acquisition of information but also through educational experiences aimed at ethical and social commitment. Within this framework, González-Alberteris and Rojas-Sánchez (2023) affirm that the formation of environmental values promotes the consolidation of responsible attitudes toward ecosystem care and sustainability. Similarly, Conopoima Moreno (2021) highlights the role of the family as a fundamental space for strengthening ecological habits and values from an early age, complementing the educational function of schools and universities. From this perspective, environmental values are not merely abstract principles but emerge through material and discursive interactions, as noted by Serenella Iovino and Serpil Oppermann, who emphasize that "*matter narrates, and these narratives are embedded in material forms, bodies, and environments*" (Iovino & Oppermann, 2014, p. 6).

Project-based learning, practical activities, and direct experiences were also identified as relevant pedagogical strategies for strengthening environmental awareness among students. The reviewed studies indicate that active and participatory methodologies facilitate the connection between academic content and real environmental problems, thereby promoting meaningful learning experiences. According to Ayerbe López and Perales Palacios (2025), project-based learning positively influences environmental awareness because it encourages critical reflection, collaborative work, and problem-solving related to ecological issues. In this regard, educational practices focused on active participation contribute to strengthening students' commitment to sustainability and environmental responsibility. Participatory and critical pedagogies are central to this process, aligning with Paulo Freire's assertion that "*education either functions as an instrument to bring about conformity or as a practice of freedom*" (Freire, 1970, p. 34), thereby reinforcing the role of environmental education as a transformative and emancipatory practice.

Likewise, practical experiences related to environmental education promote ecological sensitivity and the adoption of sustainable behaviors. Activities such as school gardens, environmental campaigns, and community projects allow students to establish direct contact with environmental realities and understand the consequences of human actions on ecosystems. Trujillo Oñate (2024) states that experiential pedagogical strategies contribute significantly to the development of a stronger and more committed environmental awareness. Furthermore, Mauris De la Ossa et al. (2025) emphasize that active educational practices implemented in Latin America strengthen student participation and the construction of sustainable values within school contexts.

Another relevant finding concerns the importance of transversal curricular integration in environmental education. The analyzed studies indicate that sustainability should be addressed in an articulated manner across different areas of knowledge in order to ensure comprehensive education oriented toward social and environmental responsibility. Garzón Guerra and Acuña Beltrán (2016) argue that transversal projects foster the development of civic competencies related to coexistence and social participation. Similarly, Caicedo Bayona et al. (2025) emphasize that curricular transversality strengthens institutional commitment to sustainability and the construction of environmentally responsible educational cultures.

The reviewed literature also demonstrates that environmental education positively influences the development of pro-environmental attitudes and students' participation in sustainable actions. The findings of Andrade Salazar and Gonzales Portillo (2019) reveal a significant relationship between ecological knowledge and responsible environmental behaviors. Likewise, Estrada Araoz et al. (2022) indicate that environmental awareness strengthens sustainable practices among secondary school students, including recycling habits, responsible resource use, and ecosystem protection. These results confirm that educational processes focused on environmental sustainability can generate meaningful transformations in students' attitudes and behaviors.

Finally, social and environmental responsibility emerged as a fundamental dimension within contemporary educational processes. Educational institutions play a strategic role in promoting ethical values and sustainable practices that contribute to environmental protection and social well-being. Pérez Espinoza et al. (2016) argue that environmental social responsibility promotes a sustainable vision based on the balance between economic development, ecological conservation, and collective welfare. Likewise, Torres Maya and Verdecia Marín (2021) emphasize that university social responsibility strengthens students' ethical and environmental education, fostering institutional cultures committed to sustainability and integral human development. Therefore, environmental education constitutes a strategic tool for building more responsible, participatory, and sustainable societies. Ultimately, the effectiveness of environmental education lies not only in knowledge acquisition but in its capacity to reshape habits and worldviews, recalling David W. Orr's well-known claim that "*the planet does not need more successful people; it needs more peacemakers, healers, restorers, storytellers, and lovers of all kinds*" (Orr, 2004, p. 4).

Taken together, the findings discussed in this study suggest that environmental education can be more productively understood as a dynamic and relational process that connects knowledge acquisition, value formation, and active civic engagement. Rather than operating as isolated pedagogical dimensions, these elements appear to function within an interconnected framework in which environmental awareness emerges through the interaction between cognitive understanding, ethical positioning, and embodied experience. In this sense, participatory methodologies, interdisciplinary integration, and value-oriented practices do not simply complement each other but co-constitute the conditions under which pro-environmental attitudes and behaviors are developed. This integrative perspective allows for the conceptualization of environmental education as a transformative continuum linking awareness, responsibility, and action, ultimately contributing to the formation of environmentally engaged citizens capable of responding to contemporary ecological

challenges. This perspective also opens the way for future research aimed at empirically validating this relational framework across different educational contexts.

Conclusions

This study demonstrates that environmental education cannot be reduced to the transmission of ecological knowledge, but must be understood as a transformative and relational process through which environmental awareness, ethical responsibility, and civic engagement are co-constructed within contemporary educational contexts. Within this framework, environmental awareness in contemporary educational processes constitutes a fundamental axis for the formation of citizens committed to sustainability and the preservation of the natural environment. The analysis carried out made it possible to identify that environmental education goes beyond the transmission of ecological content, as it promotes the strengthening of values, attitudes, and responsible behaviors in response to current environmental challenges. Likewise, it was evidenced that the integration of interdisciplinary approaches favors a broader understanding of environmental problems by connecting social, cultural, economic, and ecological dimensions within educational processes.

Similarly, active and participatory pedagogical strategies proved to be relevant tools for strengthening environmental awareness among students. Methodologies such as project-based learning, practical activities, and direct experiences significantly contribute to the development of critical thinking, social participation, and meaningful learning related to sustainability. In addition, curricular transversality makes it possible to incorporate environmental education into different areas of knowledge, promoting comprehensive training oriented toward social and environmental responsibility within educational institutions.

On the other hand, the analyzed studies demonstrated that environmental education positively influences the development of pro-environmental attitudes and student participation in sustainable actions. The formation of ecological values strengthens responsible behaviors related to natural resource conservation, ecosystem protection, and the construction of more sustainable communities. Consequently, it is essential for educational systems to continue strengthening policies and pedagogical practices oriented toward sustainability by promoting an environmental culture based on active participation, ethical commitment, and shared social responsibility in response to contemporary environmental challenges.

Conflict of interest statement

The author declare that this research was conducted in the absence of any financial, commercial, institutional, or personal relationships that could be interpreted as a potential conflict of interest. Likewise, it is guaranteed that the development of the study responded exclusively to academic and scientific purposes, maintaining criteria of objectivity, ethics, and integrity in the analysis and interpretation of the information.

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