

RETHINKING THE HUMAN, RECONFIGURING BONDS: ETHICAL AND EPISTEMOLOGICAL HORIZONS FOR ENVIRONMENTAL EDUCATION

Repensar lo humano, reconfigurar los vínculos: horizontes éticos y epistemológicos para la educación ambiental

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Date received: 03/11/2025

Date accepted: 22/12/2025

Online publication date: 23/06/2026

How to cite this article / Cómo citar este artículo: Bautista-Cerro Ruiz, M. J. (2026). Rethinking the Human, Reconfiguring Bonds: Ethical and Epistemological Horizons for Environmental Education [Repensar lo humano, reconfigurar los vínculos: horizontes éticos y epistemológicos para la educación Ambiental]. *Teoría de la Educación. Revista Interuniversitaria*, 38(2), 21-38. <https://doi.org/10.14201/teri.32968>

ABSTRACT

The current ecological and civilizational crisis calls for a profound revision of the ethical and epistemological foundations through which humanity has historically related to the environment. This article offers a theoretical and critical exploration of the main conceptual frameworks that have shaped the modern understanding of human beings and their relationship with nature: from classical anthropocentrism, which positioned the human (though not all humans) as the measure and end of all things, to contemporary approaches that seek to modulate or reconfigure that relationship, such as biocentrism, ecocentrism, ecofeminism, decolonial thought, and posthumanist perspectives.

The analysis identifies convergences around a relational and complex understanding of life, but also critical tensions, such as the risk that posthumanist decentering may dilute moral and political responsibility, or that global sustainability discourses may perpetuate anthropocentric and technocratic biases. From this standpoint, the paper argues that environmental education must integrate the ethical, political, and epistemic dimensions of civilizational transformation. It highlights the need for an environmental education capable of challenging the narratives of domination, separation, and human exceptionalism that have underpinned Western thought, while fostering a relational, interdependent, and ecosocial understanding of existence.

In the context of ecosocial collapse and climate emergency, the article advocates for repoliticizing environmental education as a space for ethical dialogue, ecosocial justice, and collective learning oriented toward rebuilding the bond between humanity and nature. Ultimately, it calls for a new ecosocial pedagogy that recognizes our ecodependence and assumes the shared responsibility of ensuring the sustainability of life on Earth.

Keywords: environmental education; anthropocentrism; ecofeminism; posthumanism; social justice.

RESUMEN

La crisis ecológica y civilizatoria actual exige revisar los fundamentos éticos y epistemológicos desde los que la humanidad se ha relacionado históricamente con el medio. Este artículo propone un recorrido teórico-crítico por los principales marcos conceptuales que han configurado la visión moderna de los seres humanos y su relación con la naturaleza: desde el antropocentrismo clásico, que situó al ser humano (aunque no todos los seres humanos) como medida y fin de todas las cosas, hasta las corrientes contemporáneas que buscan modular o reconfigurar esa relación, como el biocentrismo, el ecocentrismo, el ecofeminismo, el pensamiento decolonial y los enfoques posthumanistas.

El análisis que se presenta reconoce convergencias en torno a una comprensión relacional y compleja de la vida, pero también tensiones críticas, como el riesgo de que el descentramiento posthumanista diluya la responsabilidad moral y política, o de que los discursos globales de sostenibilidad mantengan sesgos antropocéntricos y tecnocráticos. Desde esa mirada, se sostiene que la educación ambiental debe integrar las dimensiones ética, política y epistémica del cambio civilizatorio. Se argumenta la necesidad de una educación ambiental capaz de cuestionar las narrativas de dominio, separación y excepcionalidad de lo humano, que han sido la base del pensamiento occidental, e impulsar una comprensión relacional, interdependiente y ecosocial de la existencia.

En un contexto de colapso ecosocial y emergencia climática, se propone repoliticizar la educación ambiental como espacio de diálogo ético, de justicia ecosocial y de aprendizaje colectivo, orientado a la reconstrucción del vínculo entre humanidad y naturaleza. En definitiva, se aboga por una nueva pedagogía ecosocial que reconozca nuestra ecodependencia y asuma la responsabilidad compartida de garantizar la sostenibilidad de la vida en el planeta.

Palabras clave: educación ambiental; antropocentrismo; ecofeminismo; posthumanismo; justicia social.

1. INTRODUCTION

Planet Earth is currently facing a moment of profound emergency. In 2009, the Stockholm Resilience Centre identified nine fundamental Earth-system processes that regulate the stability of life on the planet, establishing planetary boundaries that should not be exceeded (Rockström et al., 2009). At that time, three of these boundaries had already been crossed; by 2025, this number has risen to seven (Potsdam Institute for Climate Impact Research, 2025). The most recent boundary added to this list is ocean acidification, with severe consequences not only for marine ecosystems but, as with the other processes, for the overall balance of the Earth system.

It has long been widely acknowledged that the environmental problems confronting the planet are anthropogenic in origin and closely linked to the ways in which human beings have shaped their modes of existence on Earth: how they inhabit it and render it either habitable or, conversely, uninhabitable.

Within this context of accelerating environmental degradation, environmental education emerged as a response to the severe impacts of human activities. As early as the 1972 Stockholm Conference, the need to define human rights and duties in relation to the environment was articulated, drawing attention to the connection between economic systems and environmental deterioration. From its inception, environmental education aspired to intervene across all spheres of life (United Nations, 1972). However, its practical implementation often gravitated toward a naturalistic and conservationist orientation marked by an anthropocentric bias that remains difficult to overcome today (Macintyre et al., 2024). Despite growing evidence of increasingly acute environmental crises, attention frequently fails to focus on inter- and intra-species relationships, with techno-optimism often prevailing as a response to scientific or ecological pessimism.

Today, the educational challenge has become even more complex. The international community broadly agrees that education constitutes a strategic arena for addressing the planetary crisis (Nusche et al., 2024; UNESCO, 2021). This article proposes a hopeful dialogue aimed at exploring how environmental education can offer new theoretical and pedagogical insights to reframe the role of human beings within an increasingly complex context shaped by environmental alarm.

This contribution is conceived as a theoretical-critical essay that examines the epistemological, ethical, and pedagogical foundations of environmental education within the framework of the contemporary ecosocial crisis. It advances an integrative reflection grounded in the analysis of diverse currents of thought, ranging from modern thought and its anthropocentric legacy to posthumanism, and including biocentric, ecocentric, and ecofeminist approaches. The paper explores how these perspectives provide essential contributions to addressing the environmental crisis and how posthumanist approaches, in particular, can offer valuable insights for rethinking the human role.

Rather than offering definitive answers, this essay seeks to open a space for theoretical and pedagogical dialogue capable of inspiring new educational practices oriented toward care and ecosocial justice.

2. THE ANTHROPOCENTRIC BIAS IN THE PERCEPTION OF THE ECOSOCIAL CRISIS

In environmental terms, a *tipping point* refers to the moment at which a system reaches a threshold beyond which change becomes irreversible. It marks the point at which an apparently gradual or incremental trend accelerates and abruptly alters the system's dynamics. One may imagine, for instance, a mass of ice slowly melting under the sun's heat. For a time, the transformation remains barely perceptible; however, if conditions persist, a threshold may be crossed after which melting accelerates uncontrollably and cannot be reversed, even if temperatures subsequently decline, whether gradually or abruptly.

A substantial proportion of mature ecosystems have required centuries to emerge and consolidate, as well as to establish their role in essential ecological functions that sustain life, such as pollination or soil formation (Escudero, 2025). Yet these ecosystems and their interconnections may reach critical thresholds at which they lose their capacity for self-regulation and, in extreme cases, collapse. Societies, too, may collapse when certain conditions, such as environmental degradation, economic inequality, or the erosion of social cohesion, undermine their foundational structures. As Diamond (2005) warns, societal collapse is not driven solely by environmental factors, but also by the failure of elites to recognize warning signs and take timely action.

At present, we find ourselves in a context in which world leaders, business actors, and citizens alike appear to systematically disregard scientific reports and recommendations, including those issued by the IPCC (Intergovernmental Panel on Climate Change) and the IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services), to name just two authoritative bodies. This form of blindness is not new. As early as 1972, the Club of Rome warned in *The Limits to Growth* (Meadows et al., 1972) of the link between human activity and environmental degradation, and of the need to replace the logic of unlimited growth with models oriented toward sustainability.

From a geopolitical perspective, the environmental crisis is not ignored due to a lack of knowledge, but because addressing it would profoundly disrupt power balances, economic interests, and territorial strategies among major global actors. At the individual level, Hamilton, cited by Latour (2012), argues that we are all climate change deniers insofar as we are unable to reconcile the human scale with the magnitude of the catastrophe. As Latour observes, it is the indifference we have internalized that leads us to deny the knowledge produced by our own science (2012, p. 69).

Yet the very science that Latour maintains we have ignored provides clear evidence of the physical causes of the environmental crisis and points toward its

primary solution: curbing the burning of fossil fuels. The challenge lies in the fact that this energy underpins our societies, making it difficult to identify viable alternative pathways, transformative strategies, and the requisite drivers for such change, particularly from the perspective of social justice. As Jameson (2003) remarked, it is easier to imagine the end of the world than the end of capitalism.

This impasse is closely related to the way human beings perceive themselves and the environment in which they are embedded. The natural environment has historically been understood as a reservoir of resources from which humanity extracts raw materials to satisfy its needs and desires, yet one to which it has not perceived itself as belonging, at least within Western traditions. The relations of dependence that sustain life have largely been rendered invisible, while narratives of domination and control have been reinforced. However, all forms of life, including human life, depend on the services provided by ecosystems through complex processes and cycles. The water cycle is perhaps the most widely recognized, but so too are the carbon, phosphorus, and hydrogen cycles that enable fertile soils, as well as processes such as photosynthesis, which makes oxygen production possible, or pollination, which sustains biodiversity. It is important to acknowledge that our conceptual frameworks remain biased, privileging a human-centred perspective when we speak of “natural resources” or ecosystem services.

There are multiple ways of seeing, explaining, and questioning the central role that human beings have assigned themselves on the planet. Increasingly, we are becoming aware of the magnitude of the problems we have created and of how the perspective from which we approach them shapes both our interpretations and our attempts to address them.

3. HISTORICAL AND CULTURAL ROOTS OF WESTERN ANTHROPOCENTRISM

Human beings have progressively constructed relationships with their environment shaped by material conditions and by the belief systems developed over time. Beyond certainties whose foundations are difficult to sustain, humanity has created a worldview in which it could feel secure, assuming that it knew, understood, and controlled its environment.

Throughout history, narratives have prevailed that established both interspecific and intraspecific hierarchies, positioning human beings, and more specifically men, at the apex of a symbolic pyramid endowed with rights and privileges. Below were placed all other living beings, including women, who were not regarded as equals (Shiva, 1988, 2024). In parallel, patriarchal, colonial, and capitalist dynamics have historically reinforced distinctions among human beings based on cultural, economic, and geographical factors (Escobar, 2015), with gender operating as a transversal axis across these forms of differentiation.

In Western thought, since Antiquity, multiple domains of knowledge have consolidated the idea of human superiority over nature. Within Judeo-Christian theology,

the biblical injunction to “dominate the Earth” in the Book of Genesis legitimized an instrumental view of nature placed at the service of humankind, a perspective subsequently appropriated and normalized within Western culture. Aristotle, in his *Politics*, argued that nature does nothing in vain and that animals and plants exist for the sake of humans. He articulated the *Scala Naturae*, a natural hierarchy in which all living beings were ordered, with man positioned at the summit.

3.1. *Modernity, rationalism, and the ontological separation between humanity and nature*

The scientific revolution of the sixteenth and seventeenth centuries marked a profound intellectual transformation in the West, driven by figures such as Copernicus, Bacon, Galileo, Descartes, and Newton. Their ideas reconfigured relationships between human beings, knowledge, power, and nature. Faith in reason was consolidated, along with the conception of nature as an ordered system governed by universal laws that humans could uncover. This radical reconfiguration of world-view produced a substratum of thought that, without questioning the centrality of humankind, separated subject and object, framing nature as something external to human existence. As Bookchin (2022) observes, this dualism replaced the Hellenic continuity between mind and nature with an insurmountable divide, maintaining the individual in a position of superiority over other living beings.

The Newtonian model further reinforced the notion of human dominion over nature and the treatment of natural goods as resources available for exploitation. Crucially, “humanity” at this historical moment referred not to humankind as a whole, but to the white, European, property-owning man; the rest of humanity, including women, and nature itself were construed as exploitable territory (Rist, 2002).

Cartesian rationalism and empiricism consolidated an anthropocentric model that legitimized the transformation and domination of the environment (Novo, 2006). In this way, Western rationalism deepened a vision of reality characterized by the treatment of nature as a source of benefits for human beings. Although often framed as a universal right, access to and enjoyment of nature functioned in practice as a privilege, unevenly distributed across individuals and communities. This ethnocentric and androcentric anthropocentrism sustained a hegemonic narrative in which the Western white man was constructed as the universal reference for progress, relegating non-Western cultures and worldviews to a position of inferiority. Within this logic, nature acquired value only when transformed into a resource, a forest as timber, soil as arable land. The same reasoning extended to care work and the reproduction of life, traditionally performed by women and considered unproductive and economically insignificant (Bautista-Cerro Ruiz & Díaz González, 2025).

These beliefs are products of history, yet they also actively produce history (Rist, 2002). This enduring separation between the human and the non-human has permeated all areas of knowledge: law and politics reserved the attribution

of rights exclusively to persons, excluding animals and ecosystems (Stone, 2010), while classical and neoclassical economics conceptualized nature as a resource or as productive capital (Smith, 1994; Daly, 1996). However, this worldview is not universal. Across all continents, alternative ways of relating to the natural environment have long existed.

Among Indigenous cultures in the Americas, the Quechua and Aymara peoples conceive of Pachamama (Mother Earth) as a living being deserving respect and care. Maya cosmology similarly understood human beings as part of a balance with nature. In Asia, Tibetan Buddhism promotes non-violence toward all living beings (*Abimsa*), translating into practices aimed at minimizing harm and environmental impact. In Oceania, the Māori of Aotearoa/New Zealand uphold the principle of *kaitiakitanga*, which entails stewardship of nature as a sacred duty rooted in the interconnection between humans and the natural world. Across these perspectives, human beings are understood not as masters of nature, but as one element among others engaged in the shared struggle for survival and resources.

Like an imperceptible *Matrix*, anthropocentrism underlies the Western conception of the world and the functioning of contemporary systems. As Boff (2012) notes, most of us have never seriously questioned this way of understanding things. It seems natural to see humanity as something above or apart from the rest of the Earth community. This assumed position of superiority facilitates a form of blindness toward indiscriminate exploitation and environmental harm, from which humans themselves are not immune.

The scientific revolution introduced a rational vision grounded in observation, experimentation, and causality, leading to linear and fragmented understandings of reality. For centuries, this framework enabled remarkable scientific and technological advances; yet it proved ill-equipped to address complex phenomena, precisely those that characterize ecological and social systems.

3.2. *Epistemological alternatives to the anthropocentric paradigm*

During the twentieth century, new perspectives emerged that shifted attention toward relationships, circularity, feedback, and interdependence. Ludwig von Bertalanffy proposed General Systems Theory as an alternative to dominant reductionism (Bertalanffy, 1973). According to this approach, systems must be understood as organized wholes whose elements are constantly interrelated and cannot be analyzed in isolation. The world is thus conceived as the product of dynamic and interdependent relationships.

Systems thinking challenges the separation between subject and object, nature and society, proposing instead an interrelational perspective. It allows the planet to be understood as a system in which diverse elements, biotic and abiotic components, flows of information, matter, and energy, interact continuously (Meadows, 2022). From this standpoint, the natural environment cannot be

understood without considering the connections among its elements, including human beings, not only as biological organisms, but also through their physical and cultural formations.

Nevertheless, although systems theory overcomes Cartesian dualism, its application has often remained subordinated to instrumental logics, thereby reproducing subtle forms of anthropocentrism. Even where relationships were conceptualized as less hierarchical and more relational, assumptions of human superiority frequently persisted. Despite acknowledging interdependencies, decision-making processes continued to prioritize short-term growth and economic profitability over environmental preservation, care for ecosystems, and the well-being of future generations.

In the second half of the twentieth century, complexity thinking further expanded the systems approach by integrating biological, social, and cultural dimensions, as well as uncertainty and contingency. Developed primarily through the work of Edgar Morin and informed by contributions from Prigogine, Maturana, Varela, and Bateson, complexity thinking seeks to integrate diverse forms of knowledge and to recognize uncertainty, contradiction, and interdependence as constitutive features of living and social systems.

From this perspective, the human being cannot be understood in isolation; it can only be understood in relation to the world, to others, and to itself, as a biological, psychological, social, and cultural being, understood as an inseparable whole (Morin, 1986). Humanity is therefore not positioned at the centre of the world, nor separated from nature, but embedded within a network of interconnected systems.

Complexity thinking acknowledges human specificity through consciousness and reflexivity yet seeks to transcend anthropocentrism by integrating ethical responsibility toward the totality of life and the planet. For Morin, understanding complexity entails recognizing that human beings are simultaneously fully biological and fully cultural, carrying within themselves this original uniduality (2001). Humanity is thus at once individual, society, and species, an understanding that calls for rethinking the relationship between humanity and the biosphere in terms of interdependence and mutual responsibility.

Together, systems thinking and complexity theory open conceptual pathways to key notions such as uncertainty, interconnection, interdependence, and irreversibility, concepts that are central to understanding humanity's role and responsibility in the contemporary environmental crisis.

3.3. *Ethical shifts: from anthropocentrism to biocentrism and ecocentrism*

In contrast to anthropocentrism and the assumption that only human beings are worthy of moral consideration, biocentrism emerges as an ethical-philosophical current that affirms the intrinsic value of all living beings. Moving beyond utilitarian conceptions of nature and its inhabitants, biocentrism situates all forms of life on an

equal ethical plane, asserting that the notion of human superiority is not a biological fact but an ethical construction.

From biocentric perspectives, human supremacy over other beings is fundamentally questioned, and an attitude of respect and shared responsibility toward the systems that make life possible is promoted. Schumacher (1978), in line with biocentric thinking, stressed the need to distinguish between ends and means, warning against the risk of reducing the Earth to a mere instrument of production. His argument points to a core dilemma: whether the planet is to be conceived as a resource at humanity's disposal or as an end in itself. Similarly, Jonas (1979) asks whether we should heed the call to respect the dignity of life itself, ultimately concluding that humanity bears an ethical obligation to preserve life on Earth and to safeguard future generations.

Biocentrism provides the ethical foundation of deep ecology, a philosophical movement advanced by thinkers such as Arne Naess. This perspective adopts a holistic vision that recognizes the intrinsic value of all living and non-living entities on the planet. For Naess (1973), human beings are an inseparable part of the environment they inhabit, and their existence depends on a dense web of interrelations within natural systems. Naess famously distinguished between shallow ecology and deep ecology. The former addresses environmental problems primarily from the standpoint of human well-being and relies largely on technical solutions, remaining anchored in utilitarian and anthropocentric assumptions. Deep ecology, by contrast, affirms the ontological equality of all living beings.

Ecocentrism further broadens this approach by asserting that value resides in the integrity of ecosystems and in the networks of interdependence that sustain them (Leopold, 1949; Callicott, 1989). Aldo Leopold's proposal to conceive the Earth as a "biotic community" of which humans are members represents a decisive shift away from dominative conceptions of nature.

Nevertheless, the ethical reflection required, both individually and collectively, to recognize ourselves as members of a community of life situated on the same ontological plane as other living beings has not yet been fully realized. In this sense, the dominant worldview may be characterized as a form of weak anthropocentrism.

Weak anthropocentrism constitutes the ethical substratum upon which so-called shallow ecology is grounded, with human beings remaining at the centre of moral concern. From this standpoint, nature is protected primarily for its instrumental value to humans (Norton, 1991), while the ontological and moral centrality of humanity within the hierarchy of values remains intact. Like shallow ecology, it promotes environmental conservation without questioning the economic and cultural structures that underpin the domination of nature. Thus, weak anthropocentrism may be said to provide the philosophical grounding for shallow ecology, just as biocentrism underpins deep ecology, offering an environmental ethic oriented toward human self-preservation rather than toward transforming the relationship between humanity and the biosphere.

3.4. *Ecofeminism, decoloniality, and the reconfiguration of the ideal of humanity*

Within this broader reflection on the currents that shape understandings of the human role within and alongside the environment, ecofeminism contributes a perspective that integrates ecological and social critique. From this viewpoint, relations of domination over nature are inseparable from patriarchal structures that have historically positioned women within differentiated spheres of importance, decision-making, and action (Herrero, 2015; Puleo, 2022).

Rather than representing a simple convergence of environmentalism and feminism, ecofeminism encompasses a set of theoretical and practical approaches that simultaneously challenge the anthropocentrism and androcentrism sustaining the dominant civilizational model. Its aim is not merely to combine feminist and ecological concerns, but to reformulate the very ideal of humanity by proposing an ethics of care and interdependence as the foundation for reconstructing human identity in harmony with the web of life (Bautista-Cerro Ruiz, 2021). In contrast to the image of the human being as an autonomous subject and dominator of nature, ecofeminism advances a relational conception of the individual as ecodependent and interdependent, not only on other living beings, but also on the natural cycles that sustain existence.

As Puleo (2014) argues, the richness of ecofeminism lies in the plurality of lived contexts and feminist traditions that nourish it, giving rise to diverse strands which, despite their specific nuances, share a common critical horizon: the denunciation of the devastation of the Earth wrought by a productivist system and the articulation of alternative ways of organizing life. From this perspective, ecofeminism directly challenges the logic of productivism and unlimited growth that has distorted relations between humanity and the environment. As Mellor (1997) and Herrero et al. (2019) emphasize, this logic not only ignores human dependence on natural systems, but also obscures the central role of care work, historically assigned to women and excluded from conventional economic frameworks.

Ecofeminism thus emerges as a critique of patriarchal rationality, revealing that both the exploitation of nature and the subordination of women share a historical origin rooted in processes of invisibilization and devaluation (Merchant, 1980). In this sense, ecofeminism confronts anthropocentrism by underscoring ecological interdependence, while simultaneously challenging androcentrism by reclaiming the legitimacy of feminized knowledge and practices in the governance of life.

Alongside ecofeminist critiques, it is essential to consider decolonial approaches and the *Buen Vivir* paradigm (from the Andean concepts of *sumak kawsay* and *suma qamaña*), which challenge the Western modern ideal of humanity and advocate worldviews centered on reciprocity, interdependence, and respect for Mother Earth (Gudynas, 2011; Escobar, 2015). From a decolonial perspective, the Eurocentric foundations of modern thought are questioned for legitimizing hierarchies of power, knowledge, and being that have relegated nature and the peoples of the Global

South to subordinate positions. These approaches propose an epistemological shift that recognizes the plurality of knowledges and ontologies, recovering ways of life and human–nature relations rooted in Indigenous traditions (Quijano, 2000; Mignolo, 2011). They emphasize that non-Western societies are neither backward nor transitional, but possess their own rhythms, values, and rationalities (Chakrabarty, 2008). Nonetheless, despite political decolonization, Western paradigms continue to shape educational systems through globalization, manifesting in pressures to modernize and reform education in accordance with international standards (Wals et al., 2022).

The *Buen Vivir* paradigm articulates a relational ethic grounded in cooperation and respect for natural cycles, placing the rights of nature at its core. As both a political and philosophical proposal, *Buen Vivir* redefines development and humanity itself, displacing notions of individual progress in favor of collective harmony with the environment.

Together, ecofeminist and decolonial approaches critically revise Western conceptions of human–environment relations and advance a renewed ideal of humanity, one conceived not as the dominator of the natural world, but as a conscious participant within a network of vital interdependencies.

3.5. *Posthumanism and the reconfiguration of agency in the technocapitalist era*

Posthumanist theories propose a more radical rupture with anthropocentric assumptions by dissolving distinctions between humans and nature, to the extent that even the boundary between the living and the inert is rendered unstable. From this perspective, all forms of dichotomy are excluded from the interpretation of reality, giving rise to a radically horizontal ontology (Braidotti, 2025). Thought, creativity, and action are no longer understood as exclusively human capacities, but as processes distributed across technical, technological, and material entities. *Agency*, conceived as the capacity to affect and be affected within a network of relations, is thus understood as distributed and devoid of intentionality (Morton, 2012).

According to Chavarría Alfaro (2015), the emergence of cybernetics in the mid-twentieth century introduced the notion of humans as information processors, equating human beings with intelligent machines. This shift entailed a progressive “disembodiment” of reason, displacing the idea that rationality was an exclusively human attribute. With the advent of increasingly sophisticated computing systems, reasoning began to be attributed to artificial entities as well. Consequently, with the development of artificial intelligence and digital networks, the notion of humanity loses its presumed fixed essence and becomes fluid and hybrid.

From posthumanist perspectives, the world we inhabit is constituted by dense networks of material and symbolic mediations that actively participate in shaping reality, influencing both our perception of the environment and our modes of action within it (Morton, 2012). Satellites, climate prediction algorithms, digital platforms, and data infrastructures are thus not neutral tools, but active agents in the configuration of ecosocial reality.

Posthumanist approaches situate objects on a horizontal plane alongside human beings, stripping the latter of claims to centrality or superiority. In Latour's actor-network theory, for instance, reality is composed of heterogeneous networks in which humans, non-humans, technologies, policies, microorganisms, and even geological entities function as actants interacting on the same plane, producing distributed agency.

While posthumanism may appear incompatible with critiques of technocapitalism, it can incorporate and even reinforce them, provided it does not remain confined to an ontology of networks that obscures intentionality. Posthumanist thought must avoid rhetorical frameworks that naturalize the expanding presence of technology across all spheres of life while concealing political and economic responsibilities. The decentering of the human subject, if embraced uncritically, risks diluting the ethical and political responsibility that humans bear in the face of the ecosocial crisis. As Braidotti (2019) cautions, decentring should not be conflated with neutrality, even within frameworks of distributed agency, humans retain a differential capacity for action and decision-making that cannot be ignored. Excessive focus on ontological debates may obscure the material effects of the processes that have shaped, and continue to shape, ecological degradation and planetary inequalities.

Posthumanism thus invites a rethinking of the human condition, shifting it from a position of domination toward one of coexistence and co-evolution with other forms of life and intelligence. This decentring holds significant potential for dismantling the logics of domination underpinning the modern project, yet it must be accompanied by sustained political and ecological critique in order to avoid lapsing into neutrality vis-à-vis contemporary technocapitalist dynamics.

4. ENVIRONMENTAL EDUCATION: TOWARD AN ECOSOCIAL AND TRANSFORMATIVE PEDAGOGY

Education can function as a space for recognizing the plurality of ethical perspectives and for fostering dialogues that enable environmental conflicts to be understood in their full complexity. This requires questioning the structures that facilitate the uncritical transmission of hierarchical views positioning humans above nature and reproducing inequalities among human groups themselves, a task that environmental education is uniquely positioned to lead. Yet its configuration is not without controversy, as it draws upon Western scientific, social, and spiritual traditions, together with the tensions these entail.

Environmental education emerged as a hopeful response to ecological degradation and to the crises associated with the dominant development model in the second half of the twentieth century. However, in its efforts to address human-environment relations, it has at times reproduced instrumental and technocratic perspectives marked by anthropocentric assumptions. Stapp's (1969) definition remains a foundational reference point: environmental education seeks to cultivate a citizenry that

is knowledgeable about the environment, aware of how to contribute to solving environmental problems, and motivated to act accordingly. While this formulation successfully linked knowledge, awareness, and action, it also exposed a persistent tension, the difficulty of translating knowledge into changes that extend beyond the individual and resonate at political and relational levels (Gutiérrez Bastida, 2022).

Over time, environmental education has undergone significant evolution. During the 1970s, a naturalistic narrative prevailed alongside a techno-optimistic outlook in which science and technology were seen as the primary means of resolving environmental problems (Macintyre et al., 2024). Environmental education frequently focused on how environmental degradation affected human well-being and on how individuals could manage or conserve the environment, with human welfare serving as the implicit benchmark of success. The environment was thus framed as a prerequisite for development, giving rise to an unresolved tension between economic imperatives and ethical considerations (Daly, 1996).

Within this framework, the goal was to promote responsible behaviours aimed at preserving natural resources and sustaining welfare and growth, thereby maintaining an anthropocentric foundation that remained largely unquestioned. This orientation was reinforced by the dominance of a scientific-technical perspective, with strong emphasis on information transmission and limited engagement with ethical and cultural dimensions, that would later prove essential for the emergence of critical and transformative approaches.

As Morin reminds us, our systems of ideas (theories, doctrines, ideologies) are not only subject to error; they also protect the errors and illusions inscribed within them (2001). Environmental education has not been immune to such limitations, yet over time it has benefited from theoretical and practical enrichment aimed at overcoming the anthropocentric substratum from which it originally emerged.

The incorporation of biocentric principles reoriented the conceptual framework, shifting attention from human-centred interests toward recognition of the intrinsic value of ecosystems and living beings. Ecocentrism further expanded this perspective by emphasizing systemic interdependencies. Together, these approaches enabled progress toward an environmental education oriented to transforming the relationship between humanity and nature (Novo, 2017).

From the 1990s onward, dialogue with ecofeminism introduced a profound critique of relations of domination over both nature and women, while decolonial approaches and the *Buen Vivir* paradigm contributed communitarian understandings of the human-environment relationship. Environmental education thus increasingly embraced an ethics of care, ecological justice, and cultural plurality, deepening its critical and transformative potential.

Today, these debates unfold within an increasingly complex technoscientific context. Technology has become an active agent in shaping reality, influencing thought, narratives, and social relations. Artificial intelligence and digital networks mediate our interactions with the environment and shape how it is understood. Far

from being neutral, these technologies operate as power structures that determine what is considered relevant, legitimate, or visible; they reshape modes of knowledge production and reconfigure decision-making processes (Mittelstadt et al., 2016; Floridi, 2025; Crawford, 2021). Recognizing distributed agency should not result in neutrality toward technocapitalism, but rather in heightened critical awareness of how it defines what counts as valid and meaningful.

In this context, environmental education faces renewed epistemological and ethical challenges. It must acknowledge that all relationships with the environment, including those mediated by technology, are traversed by power relations, economic interests, and struggles over meaning, often in subtle or opaque ways. Consequently, the evolution of environmental education cannot be reduced to methodological or conceptual adjustments. Reframing the standpoint from which relationships between humanity, nature, and human groups are understood entails transforming the broader framework through which life, community, and education are conceptualized. This shift opens space for perspectives that do not merely refine technocratic approaches but seek to transcend them by questioning human centrality and civilizational assumptions, and by articulating broader understandings of life and interdependence.

To speak of transformative environmental education is to recognize that the relationships between natural environments and human societies, and among human groups themselves, are never neutral, but are shaped by historical, cultural, economic, and power dynamics. This perspective foregrounds the structural conditions that generate and sustain environmental problems, moving beyond approaches that reduce them to inadequate or poorly informed individual behaviours. It challenges standardized solutions such as “eco-habits” (turning off lights, recycling, and the like) that fail to address the systemic and structural roots of environmental degradation.

Within this orientation, sustainability competencies are not conceived as a checklist of individual skills, but as capacities for collective ecosocial action. Competencies such as systems thinking, complexity awareness, futures thinking, and collective action (Bianchi et al., 2022) provide the foundation for addressing challenges collaboratively and reflexively, rather than relying solely on individualized decisions grounded in technical information. These competencies are not merely prerequisites for action but constitute a conscious preparation for transformative engagement.

Transformative environmental education, far from being a supplementary component of curricula, claims centrality as a strategic space from which to contest dominant meanings of development and shared life, and to foster collective action.

5. CONCLUSIONS

Rethinking the human and reconfiguring relational bonds is not merely a conceptual exercise, but an urgent ethical and epistemological imperative in the context of the current socio-environmental crisis. It requires, first and foremost,

recognizing the situated, relational, interdependent, and ecodependent character of human existence. Over recent decades, biocentric, ecocentric, ecofeminist, decolonial, and posthumanist currents, despite their differences and internal tensions, have converged around the need to displace assumptions of human superiority and to assume ethical responsibility for the impacts that Western modes of social, economic, cultural, and technological organization exert on living systems.

Reconfiguring bonds also entails revisiting how we relate to the natural environment and to one another, while integrating the technological mediations that permeate our experience of the world. From this perspective, environmental education emerges as an indispensable space for reconstructing narratives, practices, and imaginaries capable of moving beyond technocratic reductionism and moral individualism. Transformative environmental education does not merely promote “responsible” behaviours; it actively reveals the power structures, inequalities, and productivist logics that underpin unsustainability.

Within this framework, the ethical and epistemological horizons of environmental education are not defined by the accumulation of isolated content or competencies, but by the capacity to cultivate complex thinking, critical consciousness, and collective action oriented toward ecosocial justice.

Rather than closing the debate, this essay invites environmental education to be understood as a space of contestation over meaning, where competing narratives concerning human–environment relations, development, responsibility, and possible futures are confronted. Educating thus entails critically intervening in this contestation within a planetary context marked by limits and uncertainty. From this standpoint, environmental education assumes an active role in constructing new narratives that challenge logics of domination, unlimited growth, neutrality, and techno-optimism. It is proposed as a space for ethical dialogue, ecosocial justice, and collective learning, capable of articulating diverse knowledges and fostering practices of care, reciprocity, and shared responsibility.

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