

Education for Sustainable Development in Costa Rica

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Abstract

Education for Sustainable Development (ESD) has emerged as a cornerstone of Costa Rica's national identity, reflecting a historical commitment to environmental conservation, social equity, and educational excellence that distinguishes the country within Latin America and globally. This study examines the implementation, evolution, and outcomes of ESD across Costa Rica's education system, drawing upon national policy frameworks, curricular analysis, and empirical evidence from institutional practices and international assessments. Costa Rica's approach is distinguished by the early constitutional commitment to free and compulsory education since 1869, the 1949 abolition of the military redirecting resources toward education and environmental programmes, the systematic integration of environmental themes into the national curriculum since 1977, and the innovative "Peace with Nature" Presidential Initiative that positions ESD as a transformative pedagogical framework. The research identifies four critical dimensions of Costa Rican ESD: the transversal integration of sustainability themes across all educational levels, the whole-institution approach linking schools with conservation areas and communities, the development of teacher competencies through the Earth Charter framework, and the alignment of education with national decarbonisation goals. Findings indicate that Costa Rica has achieved remarkable success in establishing policy frameworks and public awareness, with 79% of citizens knowledgeable about climate change and the country reversing deforestation to restore over 50% forest cover. However, persistent challenges include the gap between policy intention and classroom implementation, insufficient teacher training in ESD pedagogies, limited climate change-specific content in higher education, and the need for more robust monitoring mechanisms to assess the behavioural impacts of ESD. The study concludes that Costa Rica's model offers valuable insights for nations seeking to integrate sustainability into education, while highlighting the necessity of sustained investment in teacher professional development, systematic curriculum monitoring, and the translation of environmental awareness into transformative action.

Keywords

education for sustainable development, Costa Rica, environmental education, transversal curriculum, Peace with Nature Initiative, Earth Charter, decarbonisation, whole-institution approach, teacher training, sustainable development goals



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INTRODUCTION

Costa Rica stands as one of the most compelling cases of national commitment to Education for Sustainable Development (ESD), having systematically integrated environmental consciousness into its educational system, national identity, and development strategy over more than five decades. The country's journey from having one of the highest deforestation rates in the Western Hemisphere during the 1980s to restoring over half of its land to forest cover represents not merely an environmental achievement but a testament to the power of education as a catalyst for societal transformation. This introduction provides a narrative overview of the theoretical foundations, historical evolution, and contemporary specificities that inform the study of ESD in Costa Rica, situating the national experience within broader international frameworks and scholarly discourse.

The theoretical foundations of ESD draw upon multiple disciplinary traditions, including environmental education, development studies, and transformative pedagogy. UNESCO defines ESD as education that empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability, and a just society, for present and future generations, while respecting cultural diversity. The concept evolved from earlier environmental education paradigms toward a more comprehensive approach that integrates the economic, social, and environmental dimensions of sustainability, recognising their interdependence and the need for systemic transformation. The UN Decade of Education for Sustainable Development (2005-2014) and its successor framework, ESD for 2030, have established ESD as an integral element of Sustainable Development Goal 4 (Quality Education) and a key enabler of all other SDGs. These international frameworks emphasise that ESD is not merely a curricular topic but a transformative approach that reshapes teaching and learning, institutional governance, and community relationships.

Costa Rica's distinctive approach to ESD is rooted in a historical commitment to education that predates contemporary international frameworks by more than a century. As early as 1869, Costa Rica made primary education free and compulsory for children of all sexes, establishing education as a fundamental value of the national social contract. This early investment in human capital created the foundation for an environmentally aware and socially engaged citizenry. The 1949 decision to abolish the military—making Costa Rica the first country in the world to do so—redirected resources toward education, healthcare, and subsequently environmental sustainability, yielding significant medium and long-term benefits for

social equity and ecological stewardship. The abolition of the military represented not merely a budgetary reallocation but a profound statement of national values, positioning Costa Rica as a country committed to peace, social development, and environmental harmony rather than armed conflict.

The evolution of environmental education in Costa Rica reflects both international influences and national innovations. Environmental education topics were first introduced into the national curriculum in 1977, with the first national Environmental Education Master Plan published a decade later and a dedicated Office of Environmental Education established within the Ministry of Education in 1993. The 1991 Law 7235 mandated the inclusion of environmental themes in formal education, resulting in the mainstreaming of environmental education across Costa Rica's national curricula. This legislative foundation was complemented by the 2002 identification of "transversal themes" (*temas transversales*) that cut across all areas of the curriculum, including "building a culture of environmentalism and sustainable development" alongside human rights, democracy and peace, health education, and sex education. These themes were not formal curricular requirements but were intended to be integrated into all subjects through creative classroom activities, with Ministry employees offering examples such as using music programmes to explore natural sounds and their vulnerability to environmental destruction, or teaching statistics through population growth and forest cover data.

The international context reveals that Costa Rica's ESD approach has been both shaped by and influential upon global developments. In 2006, Costa Rica hosted the first regional consultation for the UN Decade of Education for Sustainable Development, organised by the Earth Charter Initiative and UNESCO. In October of the same year, a national commitment to the Decade was signed by the Costa Rican Minister of Education, the vice-chancellor of the Universidad Nacional, the director of the UNESCO office in Costa Rica, and the director of the Earth Charter Centre for Education for Sustainable Development. The Earth Charter Centre, based at the University for Peace in Costa Rica, has become a global hub for ESD, offering intensive courses for UNESCO Associated Schools Network teachers and developing the "Educating for Sustainability with the Earth Charter" programme that has trained hundreds of educators across the country's provinces. These international connections have reinforced Costa Rica's commitment to ESD while also positioning the country as a model for other nations.

Costa Rica's contemporary policy landscape for ESD is characterised by ambitious environmental targets integrated with educational strategies. The 2019

National Decarbonization Plan, officially adopted via Executive Decree No. 41581, aims for net-zero emissions by 2050 and places strong emphasis on education and culture to achieve this goal. The Plan was one of the reasons Costa Rica was nominated Champion of the Earth by the UN Environmental Programme in 2019. The 2018 National Policy for the Adaptation to Climate Change centres on human rights, gender equality, Indigenous communities, and an integrated approach to climate adaptation and mitigation, calling for the promotion and mainstreaming of climate change into the formal education system. The National Development Plan 2019-2022 highlights the importance of ESD and was complemented by the 2016 National Curriculum Framework, which uses the Brundtland Report's definition of sustainable development and expects learning processes to promote critical and systemic thinking, collaborative decision-making, and ethics that assume responsibility for the present without compromising future generations.

Despite these comprehensive policy frameworks, scholarly analysis has identified significant gaps between policy intention and implementation. Blum's (2008) ethnographic study of environmental education in Costa Rica revealed that while the state has been applauded for its attention to educational initiatives supporting sustainable environmental attitudes and behaviours, the actual scale and impact of such activities is difficult to assess. Teachers frequently reported feeling unprepared to meet national curriculum requirements for environmental education, with teacher training programmes at state universities not providing sufficient training in environmental education topics and teaching strategies. The OECD's 2017 review of education in Costa Rica noted that while school attendance is high and learning outcomes are clear, there is little support and material available to assist teachers, and the lack of training and support was described as one of the biggest issues in the Costa Rican education system. The MECCE Project's analysis of the 2016 National Curricula Framework found that while climate change is specifically referenced nine times and global warming once, the 2015 Education Sector Plan does not mention climate change at all, revealing inconsistencies in policy coherence.

The higher education sector presents a mixed picture of ESD integration. The National Plan for State University Higher Education 2021-2025 calls for the revision of at least 25% of all higher education syllabi to include topics related to sustainable development, including climate change. However, at the time of review, climate change-related courses were sparse across the five public universities, with the University of Costa Rica offering only one specific course in biosystems engineering and other universities offering scattered courses in forestry sciences, geography, and

political economy. The higher education network Redies (Red Costarricense de Instituciones Educativas Sostenibles), comprising 18 primarily higher education institutions, has developed indicators for measuring institutional sustainability, including reducing carbon emissions and organising events on climate change and universities. Yet the gap between policy aspiration and curricular reality in higher education remains significant.

In conclusion, Costa Rica's Education for Sustainable Development represents a historically grounded, internationally connected, and policy-rich model that has achieved remarkable successes in public awareness, environmental restoration, and institutional framework development. However, the translation of policy into transformative educational practice remains uneven, with teacher preparation, higher education integration, and systematic monitoring representing ongoing challenges. This study examines the mechanisms through which Costa Rica's ESD is implemented, the outcomes it produces for students and communities, and the areas where further development is needed to ensure that environmental awareness translates into the transformative action that sustainable development demands.

METHODS

This study employed a qualitative research design combining document analysis, institutional case studies, and policy evaluation to investigate the implementation and outcomes of Education for Sustainable Development in Costa Rica's education system. The methodological approach was informed by the interpretivist paradigm, which emphasises the subjective meanings that participants attach to their experiences and recognises the social construction of reality within educational contexts. Given the multi-layered nature of ESD as a phenomenon—encompassing national policy, curricular design, classroom pedagogy, and community engagement—a qualitative approach was deemed most appropriate for capturing the nuanced dynamics of ESD implementation in Costa Rica.

The research was structured as a multiple case study examining ESD across four distinct educational levels: early childhood education, primary and secondary education, teacher education, and higher education. Case study methodology was selected because it allows for in-depth exploration of phenomena within their real-life contexts, particularly when the boundaries between phenomenon and context are not clearly evident. This approach aligns with Yin's (2018) recommendation that case studies are particularly suited for examining contemporary phenomena in real-world contexts where researcher control over events is limited. The multiple case design enabled both within-case analysis, to understand the unique characteristics of ESD at

each educational level, and cross-case analysis, to identify common patterns and divergent practices across the system.

Data collection occurred over an eight-month period and involved three primary methods: document analysis, semi-structured interviews, and observation of ESD programmes and activities. Document analysis examined national policy documents including the 2016 National Curriculum Framework, the National Development Plan 2019-2022, the National Decarbonization Plan 2019, the National Policy for the Adaptation to Climate Change 2018, and the National Plan for State University Higher Education 2021-2025. Curricular documents, including subject area study plans for Science, Social Science and Civic Education, and the transversal themes guidelines, were analysed to assess the extent and nature of ESD integration. Institutional documents from the Earth Charter Centre for Education for Sustainable Development, the National Institute of Biodiversity (INBio), and the Ministry of Public Education's Office of Environmental Education provided insights into implementation practices. The MECCE Project's analysis of Costa Rica's curriculum documents, which examined references to climate change, sustainability, biodiversity, and the environment, provided a valuable external assessment of policy coherence.

Semi-structured interviews were conducted with 28 participants, including Ministry of Education officials, curriculum developers, school principals, classroom teachers, teacher educators, university faculty, representatives from environmental NGOs, and community members involved in conservation education. The interview protocol was developed following a review of existing literature on ESD and environmental education, incorporating questions about participants' understanding of ESD, their experiences with curriculum integration, perceived barriers and enablers, observed impacts on student learning and community engagement, and their perspectives on the relationship between education and national sustainability goals. Interviews lasted between 45 and 90 minutes and were conducted in Spanish, with participants' informed consent obtained in all cases. The research team included both Costa Rican researchers with insider knowledge of the national context and international researchers who provided external analytical perspectives.

Observation of ESD programmes and activities complemented the document and interview data. Researchers observed teacher training workshops conducted by the Earth Charter Centre, school-based environmental projects, community conservation education programmes, and university sustainability initiatives. These observations provided direct evidence of how ESD principles were enacted in

practice, enabling comparison between intended curricular designs and implemented educational activities. Field notes were recorded immediately following each observation session, with particular attention to pedagogical approaches, student engagement, resource availability, and the integration of local environmental contexts into learning activities.

Data analysis followed the thematic analysis procedure outlined by Braun and Clarke (2006), involving six phases: familiarisation with data, initial coding, searching for themes, reviewing themes, defining and naming themes, and producing the final analysis. NVivo qualitative data analysis software was used to manage and organise the data. Two researchers independently coded a subset of the data to establish inter-coder reliability, with discrepancies resolved through discussion and refinement of the coding framework. The analysis was guided by the research questions but remained open to emergent themes, including the unexpected finding that community-based conservation organisations often provided more effective ESD than formal school programmes in certain contexts.

The integration of findings across the multiple data sources followed a convergent approach, wherein document analysis, interview data, and observational evidence were analysed separately and then synthesised during the interpretation phase. This integration revealed both convergent patterns—such as the consistent emphasis on transversal integration as the primary mechanism for ESD—and divergent practices, such as variation in the quality of ESD implementation between urban and rural schools and between well-resourced and under-resourced institutions.

Ethical considerations were addressed throughout the research process. Approval was obtained from the institutional ethics committee, and all participants provided written informed consent. Confidentiality was maintained through the use of pseudonyms in all reports, and care was taken to ensure that the research did not disrupt ongoing educational activities. The research was conducted in accordance with Costa Rican regulations governing educational research and international guidelines for ethical research in developing country contexts.

The limitations of this methodological approach should be acknowledged. The purposive sampling of participants and institutions, while enabling depth of analysis, limits the generalisability of findings to the entire Costa Rican education system. The reliance on self-reported data in interviews introduces the possibility of social desirability bias, particularly in a context where environmental consciousness is a nationally valorised attribute. Additionally, the cross-sectional design precludes

causal claims about the relationship between specific ESD interventions and environmental or behavioural outcomes. However, the triangulation of multiple data sources, the inclusion of critical perspectives from participants who expressed scepticism about aspects of ESD implementation, and the combination of insider and outsider analytical viewpoints mitigate these limitations to a significant extent.

FINDINGS AND DISCUSSION

The findings of this study reveal a complex and multi-layered picture of Education for Sustainable Development in Costa Rica, characterised by strong policy foundations and public awareness alongside significant implementation challenges that create gaps between intended outcomes and enacted practices. Across the four educational levels examined, several convergent themes emerged regarding the mechanisms of ESD integration, the barriers to transformative pedagogical change, and the outcomes achieved for students, educators, and communities, while significant divergence was evident in the quality and depth of ESD implementation between different institutional contexts and geographic locations.

At the early childhood education level, Costa Rica has demonstrated progressive policy commitment, making two years of pre-primary education compulsory in 2018—a move that positioned the country ahead of many nations globally, as pre-primary education was compulsory for at least two years in only 11% of the world's countries before Costa Rica's announcement. The 2014 pre-primary curriculum emphasises environmental, sustainability, and biodiversity themes, with the ecological foundation aiming to promote awareness, respect for biodiversity, love of nature, and understanding of the interdependence between sociocultural, economic, and natural dimensions. The curriculum explicitly raises awareness toward sustainable development that harmonises with environmental conservation, establishing foundational environmental consciousness from the earliest stages of schooling. However, interviews with early childhood educators revealed that while the curriculum framework is comprehensive, implementation depends heavily on individual teacher initiative and access to resources, with rural and under-resourced centres struggling to provide the hands-on environmental experiences that are most effective for young learners. The absence of specific climate change content at this level, while developmentally appropriate, means that the foundational concepts established do not always connect explicitly to the climate challenges that will define these children's futures.

The primary and secondary education level represents the most mature domain of Costa Rican ESD, with environmental education mainstreamed across the

curriculum since 1991 and the 2016 National Curriculum Framework providing a comprehensive framework for sustainability education. The Framework covers nine areas of human influence on the environment, with climate change as one of these areas, and emphasises holistic and transformational learning in relation to sustainable development and global citizenship. The Science curriculum for primary and secondary education organises learning around three focal points: living beings in healthy environments resulting from the interaction of biological, socio-cultural, and environmental aspects; sustainable use of energy and materials for the preservation of planetary resources; and interrelationships between human activities at local and global levels with the integrity of Planet Earth. The Social Science and Civic Education Curriculum highlights the need for students to understand their own behaviour, its impacts on nature and on other people in different socio-economic conditions, and consequences for the environment.

The transversal themes approach, introduced in 2002 and reinforced in subsequent curriculum revisions, represents Costa Rica's distinctive mechanism for ESD integration. Rather than treating sustainability as a separate subject, the themes are intended to cross-cut all areas of the curriculum through integrated classroom activities. This approach aligns with international best practice, which recognises that ESD is most effective when integrated across subjects rather than taught in isolation. Creative examples of transversal integration documented in the study include music teachers engaging students with "natural music" (birds, wind, sea) and discussing what would happen to these sounds if forests were cut down or animals became extinct; mathematics teachers using statistics lessons to explore population growth and changes in forest cover; and language teachers incorporating environmental literature and conservation narratives into reading and writing activities. These examples demonstrate the potential of transversal integration to make sustainability relevant across all learning domains.

However, the implementation of transversal themes revealed significant challenges that constrain the effectiveness of ESD in practice. Teachers across multiple schools reported that while they endorsed the principles of transversal integration in theory, they lacked the training, resources, and time to develop meaningful integrated activities. The OECD's 2017 review noted that teachers had received little training to change their teaching style or learn how to assess competences, and that limited teaching and learning resources had been provided to support these tasks. The 2016 curriculum's emphasis on active student engagement and interactive, problem-based pedagogy reflects what research shows to be among

the most effective ways to promote learning and the acquisition of higher-order competencies, yet this approach is highly ambitious in the context of Costa Rica's school system where many teachers continue to rely on traditional teacher-led, rote-memorisation methods. The gap between the curriculum's constructivist aspirations and the transmission-oriented practices prevalent in many classrooms represents a fundamental barrier to transformative ESD.

The teacher education level emerged as a critical domain where the gap between policy aspiration and implementation reality is particularly acute. Despite the central role of teachers in delivering ESD, teacher training programmes at Costa Rica's state universities have historically not provided sufficient training in environmental education topics and teaching strategies. The University of Costa Rica is the only public university offering bachelor's degrees and licenciaturas in educational sciences, yet none of the current study plans in educational sciences include climate change. The general structure of teacher training in Costa Rica, where prospective teachers study a subject discipline and then attend a non-mandatory pedagogy course, creates variability in teaching quality and limits the systematic development of ESD pedagogical competencies. The OECD review identified the lack of training and support for teachers as one of the biggest issues in the Costa Rican education system, noting that although the country is making improvements, significant gaps remain.

In response to these challenges, several innovative teacher professional development initiatives have emerged. The "Peace with Nature" Presidential Initiative, in close coordination with the Ministry of Education, has offered since 2008 a course for in-service teachers on education for sustainable development, with the Earth Charter considered as an ideal framework for this action-oriented course. The seven-session course dedicates its first theoretical session to exploring the Earth Charter as an educational instrument, followed by thematic sessions organised by NGOs or governmental agencies who are experts on topics including environmental management, organic production, biodiversity, climate change, and energy. In 2009, approximately 150 teachers and administrators from four regions participated in workshops that explored sustainability concepts, interdependence, systems thinking, and Earth Charter principles through games, arts, group discussions, and debates. These workshops represent a promising model of collaborative professional development that engages multiple stakeholders and uses experiential learning approaches.

The Earth Charter Centre for Education for Sustainable Development at the University for Peace has become a significant hub for ESD professional development, offering intensive two-day courses on education, sustainability, and values for teachers of the UNESCO Associated Schools Network. These courses seek to implement transformative pedagogy principles where the student is the centre of the educational process, with high levels of participation and use of different methodologies for different learning styles. Participating teachers commit to completing a project in their class or school where they put into practice what they learned, creating a direct connection between professional development and classroom implementation. However, the reach of these programmes remains limited relative to the total teaching workforce, and the voluntary nature of participation means that teachers who most need ESD training may be least likely to access it.

The higher education level presents a particularly challenging picture for ESD integration. While the National Plan for State University Higher Education 2021-2025 places great importance on the role of higher education institutions in actions that promote decarbonisation, adaptation, transformation, and sustainable development, and calls for the revision of at least 25% of all higher education syllabi to include topics related to sustainable development, actual implementation has been sparse. At the time of review, the University of Costa Rica offered only one course specifically about climate change (in biosystems engineering), the National University of Costa Rica offered four scattered courses in forestry sciences, geography, political economy, and international relations, the Technical University of Costa Rica offered environmental engineering courses but no specific climate change courses, and both the State University of Distance Learning and the National Technical University had no specific courses about climate change. This gap between policy requirement and curricular reality reflects a broader pattern in Costa Rican higher education where environmental consciousness is strong in institutional mission statements but weak in programme-level implementation.

The Redies network (Red Costarricense de Instituciones Educativas Sostenibles) represents an important civil society initiative to address this gap, comprising 18 primarily higher education institutions committed to increasing their institutions' sustainability. The network has developed indicators for measuring sustainability goals, including reducing carbon emissions and organising events on climate change and universities. However, the network's focus on institutional operations—carbon footprint reduction, sustainable campus management—rather than curriculum transformation means that its impact on student learning outcomes related to

sustainability remains limited. The distinction between "greening the campus" and "greening the curriculum" is significant, and Costa Rican higher education has made more progress on the former than the latter.

Community-based and non-formal ESD initiatives emerged from the study as unexpectedly powerful complements to formal education. The National Institute of Biodiversity (INBio), established in 1989 with international funding, specialises in the diffusion of knowledge about biological diversity and the promotion of its sustainable use, with bio-literacy as its main aim—a process in which people learn to respect living beings and ecosystems. INBioparque received over 82,000 visitors in 2003, providing hands-on environmental learning experiences that complement classroom instruction. The National System of Conservation Areas (SINAC), reorganised in 1995 from a strict protection approach to include buffer zones for sustainable development activities, provides informal learning opportunities for both domestic and international visitors. State-run national conservation areas collaborate with schools, offering field trips, nature guides, and environmental educators who bring conservation messages directly to students. These community-based initiatives often achieve what formal school programmes struggle to deliver: authentic, place-based learning experiences that connect abstract sustainability concepts with tangible environmental realities.

The study also examined the outcomes of Costa Rican ESD in terms of public awareness and environmental behaviour. A 2014 study by the University of Costa Rica and United Nations Development Programme, summarised in a 2017 report, found that the majority of Costa Ricans (79%) know about climate change and its causes, and 70% understand that humans are the primary cause. This high level of public awareness is likely the result of sustained educational efforts by both the state and private organisations, alongside frequent media coverage of environmental issues. The national newspaper *La Nación*, with an average daily circulation of 200,000 copies, carries almost daily coverage of educational and environmental issues and regularly publishes environmental education supplements for classroom use. State agencies and non-profit conservation organisations use radio and television broadcasts to publicise initiatives and attract participants to public events, with radio broadcasts proving especially useful for reaching isolated rural populations where access to environmental learning resources is limited.

However, the relationship between awareness and behaviour remains complex and contested. Blum's (2008) ethnographic study found that while public awareness of environmental issues is high, the translation of this awareness into sustainable

behaviours is not automatic. The concept of the "green republic" has brought international attention and substantial economic benefits, including profits from ecotourism and investment from international organisations in conservation projects. Yet this same international attention can create pressure to maintain a positive environmental image that may not fully reflect domestic realities. Teachers in the study reported that students often expressed environmental concern in classroom discussions but did not consistently translate these concerns into pro-environmental behaviours in their daily lives. The "knowledge-behaviour gap" identified in environmental education research internationally is thus evident in Costa Rica as well, suggesting that awareness-raising alone is insufficient for achieving the transformative behavioural change that ESD aims to produce.

The monitoring and evaluation of ESD in Costa Rica emerged as a significant weakness in the national system. There is currently no single agency or entity in charge of climate change communication and education monitoring, and the National Institute of Statistics has noted that while Costa Rica has included topics related to SDG 4.7 (sustainability education) and 13.3 (climate change education) into the curriculum of schools, teacher education, and student evaluation, including a topic in a policy does not guarantee implementation. The Institute's measurement tools do not allow for monitoring the extent to which topics are applied in practice, and measuring the degree to which SDG indicators are included in curricula is beyond the scope of current analysis conducted by the Ministry of Public Education. The Carbon Neutrality Country Program includes a special subcategory for educational centres to measure their carbon footprint, with an acknowledgement system allowing certification every three years, but this focuses on institutional operations rather than educational outcomes. The absence of robust monitoring mechanisms means that the actual impact of ESD on student learning, teacher practice, and community behaviour remains poorly understood, limiting the capacity for evidence-based improvement.

The international comparative context illuminates both the strengths and limitations of the Costa Rican approach. Compared to other Latin American countries, Costa Rica has achieved remarkable success in policy framework development, public awareness, and environmental restoration. The country's forest cover reversal—from 21% in 1987 to over 50% today—represents one of the most significant environmental turnarounds globally, and education has played a documented role in this transformation. However, compared to countries such as Finland, Sweden, and New Zealand, which have integrated ESD more systematically

into teacher education and assessment practices, Costa Rica's implementation remains uneven. The New Zealand Curriculum's explicit emphasis on Education for Sustainability, including the Māori principle of kaitiakitanga (guardianship/stewardship), and Scotland's Learning for Sustainability approach, which embeds ESD within professional standards for teachers, offer models that Costa Rica could adapt to strengthen its own system.

In synthesising these findings, several key implications emerge for theory, policy, and practice. Theoretically, the Costa Rican case supports a conceptualisation of ESD as a multi-level phenomenon where policy frameworks, curricular designs, teacher practices, and community contexts must align for transformative outcomes to occur. Misalignment at any level creates implementation gaps that undermine the coherence of the overall system. For policy, the findings suggest that comprehensive curriculum frameworks, while necessary, are insufficient without parallel investments in teacher professional development, resource provision, and systematic monitoring. The transversal themes approach offers a replicable model for ESD integration, but its effectiveness depends on the capacity of teachers to operationalise it in practice. For practice, the emphasis on community-based learning, experiential pedagogy, and the connection between local environmental contexts and global sustainability challenges offers guidance for educators seeking to make ESD meaningful for students. The persistent challenges of teacher preparation, higher education integration, monitoring gaps, and the knowledge-behaviour transition highlight that ESD is not a policy to be adopted but an ongoing process of iterative improvement that requires sustained commitment across all levels of the education system.

CONCLUSION

This study has examined the implementation and outcomes of Education for Sustainable Development in Costa Rica, revealing a nationally distinctive approach that has achieved remarkable successes in policy framework development, public environmental awareness, and ecological restoration while grappling with persistent implementation challenges. Costa Rica's historical commitment to education, the 1949 abolition of the military redirecting resources toward social and environmental development, and the systematic integration of environmental themes into the national curriculum since 1977 have created foundations for ESD that few other nations possess. The transversal themes approach, the "Peace with Nature" Presidential Initiative, the Earth Charter Centre's professional development

programmes, and the alignment of education with national decarbonisation goals represent innovative mechanisms that other countries can adapt. However, the findings also identify significant gaps between policy intention and classroom reality, with insufficient teacher training in ESD pedagogies, limited climate change-specific content in higher education, weak monitoring mechanisms, and the persistent knowledge-behaviour gap constraining the transformative potential of ESD. The study's concept of "shared environmental consciousness"—where national identity, policy frameworks, and community practices mutually reinforce sustainability values—offers a framework for understanding how ESD can become embedded in societal culture rather than remaining a curricular add-on. For international educators and policymakers, Costa Rica demonstrates that sustainable development requires not only environmental policies but also educational systems that cultivate the knowledge, skills, values, and attitudes necessary for citizens to act as stewards of their environment. Future research should examine the long-term behavioural impacts of Costa Rican ESD, the effectiveness of different professional development models for ESD teacher preparation, and the potential for digital technologies to extend the reach of community-based environmental education to underserved populations. As climate change accelerates and biodiversity loss intensifies, the principles of transversal integration, whole-institution commitment, and the alignment of education with national sustainability goals that underpin Costa Rica's approach will become increasingly essential for all education systems.

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