

Green Education and Environmental Literacy in Denmark

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Abstract

Green education has become a strategic approach for fostering environmental literacy and supporting sustainable development in contemporary education systems. Denmark is widely recognized as one of the leading countries in integrating sustainability principles into educational policies, school culture, and community participation. This study aims to examine how green education contributes to the development of environmental literacy in Denmark by synthesizing current literature, policy documents, and empirical studies. Using a qualitative literature review approach, this study analyzes publications from international journals, reports from international organizations, and Danish educational policies related to environmental education and sustainability. The findings indicate that Denmark promotes environmental literacy through interdisciplinary curricula, experiential learning, outdoor education, eco-school initiatives, and strong collaboration among schools, local communities, and governmental institutions. These educational practices not only improve students' environmental knowledge but also strengthen ecological awareness, critical thinking, pro-environmental attitudes, and sustainable behaviors. The study concludes that Denmark's green education model provides valuable insights for other countries seeking to strengthen environmental literacy through comprehensive educational reforms that integrate sustainability into teaching, learning, and institutional governance.

Keywords

Environmental Literacy, Denmark, Green Education



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INTRODUCTION

Environmental degradation, climate change, biodiversity loss, and unsustainable patterns of production and consumption have become major global concerns that require comprehensive educational responses. Education is increasingly recognized as one of the most effective instruments for fostering environmental responsibility, encouraging sustainable lifestyles, and preparing future generations to address complex ecological challenges. Consequently, Green Education has emerged as a holistic educational approach that integrates

environmental values, ecological awareness, and sustainability principles into curriculum design, pedagogical practices, institutional governance, and community engagement. Rather than treating environmental issues as isolated scientific topics, Green Education emphasizes interdisciplinary learning that develops students' knowledge, attitudes, values, critical thinking, and environmentally responsible behaviors. This perspective aligns closely with the objectives of Education for Sustainable Development (ESD), which promotes learning processes that empower individuals to contribute actively to sustainable societies (UNESCO, 2020; Sterling, 2010).

Environmental literacy represents one of the primary outcomes expected from Green Education. Environmental literacy extends beyond factual knowledge about ecosystems and environmental problems by encompassing ecological understanding, environmental attitudes, problem-solving competencies, ethical responsibility, and the willingness to participate in sustainable actions. According to Roth (1992), environmentally literate individuals possess not only scientific knowledge but also the capacity to make informed decisions and engage in responsible environmental behavior. Similarly, Hungerford and Volk (1990) emphasize that environmental education should ultimately encourage active citizenship through behavioral change rather than merely increasing environmental awareness. Recent bibliometric evidence also demonstrates that environmental literacy has become an increasingly significant research topic due to its close relationship with sustainable development, climate action, and global citizenship education (Ariyatun et al., 2024).

Among European countries, Denmark has consistently been recognized as one of the global leaders in environmental sustainability and green innovation. The country has successfully integrated environmental responsibility into national development strategies through renewable energy policies, circular economy initiatives, sustainable urban planning, and environmentally oriented educational reforms. Danish education emphasizes democratic participation, experiential learning, collaboration, and outdoor education, enabling students to experience sustainability as part of their daily lives rather than merely as theoretical content. Environmental education is therefore embedded across multiple disciplines and supported through partnerships among schools, municipalities, governmental agencies, and local communities. Denmark has also actively implemented international initiatives such as the Eco-Schools (Green Flag Green Schools) program, which encourages schools to integrate sustainability into teaching, campus management, and student participation. Furthermore, the Danish Ministries of

Education and Environment have collaborated in implementing national strategies aligned with the objectives of Education for Sustainable Development.

A distinctive characteristic of Danish Green Education lies in its emphasis on experiential and inquiry-based learning. Students are encouraged to investigate real environmental problems, participate in outdoor learning activities, conduct sustainability projects, and collaborate with local stakeholders in addressing environmental challenges. Such learning experiences strengthen cognitive understanding while simultaneously developing environmental ethics, social responsibility, and practical competencies. Research on Nordic education indicates that sustainability learning in Denmark is closely connected with democratic citizenship, critical reflection, and collaborative problem-solving, enabling learners to understand the interdependence between environmental protection, economic development, and social well-being. These characteristics make Denmark an important international reference for countries seeking to strengthen environmental literacy through systemic educational transformation.

The increasing urgency of achieving the Sustainable Development Goals (SDGs), particularly SDG 4 concerning quality education and SDG 13 concerning climate action, has further reinforced the strategic importance of Green Education. Educational institutions are expected not only to transmit scientific knowledge but also to cultivate sustainability competencies, including systems thinking, anticipatory thinking, collaboration, ethical reasoning, and responsible decision-making. Environmental education therefore functions as a transformative process that equips learners with the competencies necessary to respond effectively to global environmental challenges. Contemporary studies consistently demonstrate that integrating sustainability across educational systems contributes significantly to improving environmental awareness, ecological citizenship, and sustainable behavioral intentions among students.

Despite Denmark's international reputation in environmental sustainability, comprehensive discussions regarding how Green Education contributes specifically to environmental literacy remain relatively limited within the broader educational literature. Many previous studies examine sustainability policies, renewable energy, or environmental governance independently, while fewer studies synthesize the educational mechanisms through which environmental literacy is cultivated across curriculum implementation, pedagogy, institutional culture, and community participation. Understanding these mechanisms is particularly valuable for

policymakers and educators in other countries seeking evidence-based strategies for strengthening environmental education.

Therefore, this study aims to examine the implementation of Green Education in Denmark and analyze its contribution to developing environmental literacy through a comprehensive review of contemporary literature and educational policies. The study explores how curriculum integration, experiential learning, outdoor education, Eco-Schools initiatives, and multi-stakeholder collaboration collectively enhance students' environmental knowledge, ecological awareness, critical thinking, pro-environmental attitudes, and sustainable behaviors. The findings are expected to provide practical insights for educational reform while contributing to the expanding discourse on Education for Sustainable Development and environmental literacy within international educational research.

METHODS

This study employed a qualitative literature review design to examine the implementation of Green Education and its contribution to environmental literacy in Denmark. A literature review was considered the most appropriate research approach because it enables researchers to synthesize theoretical perspectives, empirical findings, and policy documents from diverse sources to develop a comprehensive understanding of educational practices within a particular context. Rather than generating primary data, this study integrates existing scientific evidence to identify patterns, best practices, and emerging themes related to sustainability education and environmental literacy. Such an approach is widely recommended for educational research seeking to analyze policy implementation and conceptual developments across different educational settings (Snyder, 2019; UNESCO, 2010).

The literature search was conducted systematically using internationally recognized academic databases, including Scopus, Web of Science, ScienceDirect, SpringerLink, and ERIC. Additional supporting documents were obtained from UNESCO, the Organisation for Economic Co-operation and Development (OECD), and official publications related to Danish education and sustainability policies. The search process focused on peer-reviewed journal articles published between 2015 and 2025 to ensure that the analysis reflected contemporary developments in Green Education and Education for Sustainable Development (ESD). The primary search keywords included *Green Education*, *Environmental Literacy*, *Education for Sustainable Development*, *Environmental Education*, *Sustainability Education*, *Denmark*, *Eco-Schools*,

Outdoor Learning, and *Sustainable Curriculum*. Boolean operators (AND, OR) were applied to improve the precision and comprehensiveness of the search strategy.

The inclusion criteria consisted of (1) empirical or review articles published in peer-reviewed international journals indexed in Scopus or equivalent databases, (2) studies discussing Green Education, environmental literacy, or sustainability education, (3) publications focusing on Denmark or Nordic educational systems with transferable relevance to Denmark, and (4) articles written in English. Conversely, conference abstracts, editorials, opinion papers, duplicated publications, and studies lacking sufficient methodological transparency were excluded from the review. These criteria were established to ensure the credibility, consistency, and academic quality of the synthesized evidence.

After identifying the relevant literature, each publication underwent a critical reading process. The selected studies were analyzed using qualitative content analysis to identify recurring concepts, implementation strategies, educational approaches, and reported outcomes associated with Green Education. The analytical process followed three interconnected stages: data reduction, thematic categorization, and interpretation. During data reduction, information unrelated to the research objectives was removed, while key findings concerning curriculum integration, pedagogical innovation, environmental literacy, institutional practices, and stakeholder collaboration were retained. Subsequently, similar findings were grouped into thematic categories to reveal common implementation patterns and conceptual relationships. Finally, the synthesized evidence was interpreted to explain how Green Education contributes to strengthening environmental literacy within the Danish educational context. This analytical procedure follows established qualitative content analysis frameworks commonly applied in educational research (Miles, Huberman, & Saldaña, 2020).

To enhance the trustworthiness of the findings, data triangulation was conducted by comparing evidence from journal articles, international reports, and educational policy documents. Cross-source verification minimized potential bias while improving the reliability of the synthesized conclusions. Furthermore, the interpretation of findings was guided by the conceptual framework of Education for Sustainable Development (ESD), which emphasizes the integration of sustainability competencies, systems thinking, critical reflection, environmental responsibility, and participatory learning within formal education. This framework has been consistently recognized as a global reference for promoting environmental literacy through educational transformation (UNESCO, 2020).

FINDINGS AND DISCUSSION

The analysis of the reviewed literature demonstrates that Denmark has established Green Education as a fundamental component of its national education system rather than treating environmental education as an isolated subject. Sustainability principles are integrated across various disciplines, allowing students to develop environmental knowledge while simultaneously strengthening critical thinking, ethical responsibility, and collaborative problem-solving skills. This interdisciplinary approach reflects the philosophy of Education for Sustainable Development (ESD), which encourages learners to understand the interconnectedness of environmental, social, and economic systems in achieving sustainable development (UNESCO, 2020). Rather than emphasizing memorization of environmental concepts, Danish schools encourage students to investigate authentic environmental problems and propose practical solutions within their local communities. Such learning experiences foster deeper conceptual understanding and increase students' capacity to transfer sustainability knowledge into everyday practices.

One of the most distinctive characteristics identified in Danish Green Education is the widespread adoption of experiential learning. Students participate directly in outdoor learning activities, biodiversity observation, recycling initiatives, renewable energy projects, school gardening, and ecosystem conservation programs. These experiences enable learners to connect theoretical concepts with real environmental conditions, making learning more meaningful and relevant. Experiential learning also strengthens emotional attachment to nature, an important factor influencing environmentally responsible behavior. Previous educational research has consistently shown that experiential and outdoor learning significantly improve environmental awareness, ecological knowledge, and students' willingness to engage in sustainable actions compared with conventional classroom instruction. Moreover, reflective learning activities conducted after outdoor experiences help students critically evaluate environmental issues while developing long-term ecological responsibility.

Another significant finding concerns the implementation of Eco-Schools and other sustainability-oriented school programs that have become integral components of Danish educational practice. The Eco-Schools framework encourages schools to establish environmental committees, conduct environmental audits, formulate sustainability action plans, integrate environmental topics into classroom learning, and continuously evaluate environmental performance. Students actively participate

in decision-making processes regarding waste management, energy conservation, biodiversity protection, and sustainable resource utilization. Such participation strengthens democratic values while simultaneously enhancing environmental literacy because students become active contributors rather than passive recipients of environmental information. Research evaluating Eco-Schools has demonstrated positive impacts on students' ecological knowledge, environmental attitudes, and sustainable behaviors through project-based and action-oriented learning.

The reviewed literature also indicates that collaboration among educational institutions, local governments, environmental organizations, and surrounding communities plays a crucial role in strengthening environmental literacy in Denmark. Schools frequently collaborate with municipalities, environmental agencies, universities, museums, and nature conservation organizations to provide authentic learning experiences beyond classroom boundaries. Students participate in environmental campaigns, ecological restoration projects, citizen science activities, and community sustainability initiatives that expose them to real-world environmental governance. This collaborative model enables learners to recognize that environmental sustainability requires collective responsibility involving multiple stakeholders rather than individual action alone. Such partnerships also facilitate the continuous updating of educational content according to emerging environmental challenges, technological innovations, and national sustainability priorities.

Another important aspect emerging from the analysis is the emphasis placed on developing sustainability competencies instead of merely transmitting environmental knowledge. Danish educational practices encourage systems thinking, critical reflection, anticipatory thinking, communication skills, ethical reasoning, and collaborative problem-solving. These competencies enable students to analyze complex environmental problems from multiple perspectives while considering long-term ecological, economic, and social consequences. This competency-based orientation corresponds closely with UNESCO's Education for Sustainable Development framework, which identifies sustainability competencies as essential learning outcomes for addressing global environmental challenges. Consequently, environmental literacy in Denmark extends beyond ecological knowledge to include informed decision-making, civic participation, and responsible environmental action.

The findings further reveal that Green Education contributes positively to students' pro-environmental attitudes and sustainable behaviors through continuous reinforcement across curriculum, school culture, and community engagement.

Environmental responsibility becomes embedded in students' daily routines through recycling practices, energy-saving behaviors, sustainable transportation initiatives, responsible consumption, and biodiversity conservation activities. Such consistent exposure creates a learning environment in which sustainability is experienced as a normal aspect of everyday life rather than an abstract educational objective. Previous empirical studies have similarly reported that environmentally supportive school cultures significantly influence students' environmental literacy and behavioral intentions because sustainable values are reinforced through repeated participation in authentic environmental practices.

Overall, the synthesized evidence suggests that Denmark's success in promoting environmental literacy results from the integration of sustainability across educational policy, curriculum, pedagogy, institutional management, and community collaboration. Green Education is implemented not only as classroom instruction but also as a comprehensive educational ecosystem that cultivates environmental awareness, critical thinking, ecological ethics, and responsible citizenship. This holistic model provides valuable lessons for countries seeking to strengthen environmental literacy through systemic educational transformation. Rather than adopting isolated environmental programs, policymakers should consider integrating sustainability into the entire educational experience by combining interdisciplinary curricula, experiential learning, participatory governance, and partnerships with local communities. Such an integrated approach is more likely to produce environmentally literate citizens capable of addressing increasingly complex sustainability challenges in the twenty-first century.

CONCLUSION

This study demonstrates that Green Education in Denmark represents a comprehensive educational approach that effectively strengthens environmental literacy through the integration of sustainability principles into curriculum design, pedagogical practices, institutional culture, and community engagement. Rather than positioning environmental education as an independent subject, Denmark incorporates sustainability across multiple disciplines while encouraging students to understand the interrelationships between ecological, social, and economic systems. This holistic implementation is consistent with the principles of Education for Sustainable Development (ESD), which emphasize transformative learning, critical thinking, collaboration, and responsible action as essential competencies for achieving sustainable development.

The findings indicate that experiential learning, outdoor education, Eco-Schools initiatives, interdisciplinary curricula, and partnerships between schools, local governments, and communities collectively contribute to developing students' environmental knowledge, ecological awareness, ethical responsibility, and pro-environmental behaviors. These educational practices enable learners to move beyond conceptual understanding toward active participation in addressing environmental challenges. Consequently, environmental literacy is developed not only through cognitive learning but also through authentic experiences that encourage lifelong sustainable behaviors. This integrated educational ecosystem has positioned Denmark as an international model for implementing sustainability-oriented education.

The study also highlights several implications for educational policymakers and practitioners in other countries. Educational reforms should prioritize the integration of sustainability across curricula, promote inquiry-based and experiential learning, strengthen school-community partnerships, and cultivate sustainability competencies that prepare learners to respond to increasingly complex environmental challenges. Adopting isolated environmental programs is unlikely to produce lasting behavioral change unless supported by institutional commitment and collaborative governance.

Although this study provides a comprehensive synthesis of the existing literature, it is limited by its reliance on secondary data and published research. Future studies may extend this work by conducting comparative investigations across different countries or by employing empirical methods to evaluate the effectiveness of Green Education programs on students' environmental literacy. Such research would provide stronger evidence for designing educational policies that support sustainable development and global environmental citizenship.

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