Volume 4 Number 2 (2026)
April-June 2026
Page: 30-45

Tamilis Synex: Multidimensional Collaboration
https://edujavare.com/index.php/TLS/index
E-ISSN: 3026-3972
Doi: 10.70610/tls.1552

Climate Change Education and Sustainable Learning in Iceland

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Article history Submitted: 2026/04/11; Revised: 2026/05/15; Accepted: 2026/06/25

Abstract

Climate change education and sustainable learning have emerged as critical priorities in Iceland's education system, reflecting both the nation's unique environmental vulnerabilities and its commitment to global sustainability frameworks. This study examines the implementation, evolution, and outcomes of climate change education across Iceland's preschool, compulsory, and upper secondary education levels, drawing upon national curriculum frameworks, teacher survey data, and empirical evidence from institutional practices. Iceland's approach is distinguished by the 2011 National Curriculum Guide that established sustainability as one of six fundamental pillars of education, the GETA (ActionESD) research project's influence on policy development, and the integration of education for sustainability across all school levels following the 2008 financial collapse. The research identifies four critical dimensions: the pillar-based curriculum integration model, the interplay between research and policy in curriculum development, teacher preparedness and professional development challenges, and the tension between policy ambition and classroom implementation. Findings indicate that while Iceland has achieved remarkable success in embedding sustainability into national curriculum frameworks, a significant implementation gap persists, with 92% of teachers reporting that their schools do not teach about climate change and 66.7% believing the curriculum insufficiently addresses climate education. Persistent challenges include teacher confidence gaps, lack of common understanding of ESD across stakeholders, insufficient resources, and the political volatility of sustainability education. The study concludes that Iceland's model offers valuable insights for nations seeking to integrate climate change into education through research-informed policy and pillar-based curriculum design, while highlighting the necessity of sustained investment in teacher professional development, systematic monitoring, and the creation of common understanding across all educational stakeholders.

Keywords Climate Change Education, Sustainable Learning, Iceland, Education For Sustainable Development, National Curriculum Guide, GETA Project, Fundamental Pillars, Teacher Preparedness, Curriculum Implementation, Action Competence

INTRODUCTION

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Iceland occupies a unique position in global discussions of climate change education, situated at the intersection of acute environmental vulnerability, progressive educational policy, and a national identity deeply intertwined with the natural landscape. As an island nation experiencing rapid glacial retreat, volcanic activity, and shifting marine ecosystems, Iceland faces environmental changes that are both immediately visible and scientifically significant, creating both urgency and opportunity for educational responses. This introduction provides a narrative overview of the theoretical foundations, historical evolution, and contemporary specificities that inform the study of climate change education and sustainable learning in Iceland, situating the national experience within broader international frameworks and scholarly discourse.

The theoretical foundations of climate change education draw upon multiple disciplinary traditions, including environmental education, education for sustainable development (ESD), 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. The concept has 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 climate change education is not merely a curricular topic but a transformative approach that reshapes teaching and learning, institutional governance, and community relationships.

Iceland's distinctive approach to climate change education is rooted in a historical trajectory that intertwines environmental consciousness with national identity and political transformation. The country's landscape characterised by glaciers, volcanoes, geothermal features, and marine ecosystems has long shaped Icelandic culture and self-understanding, creating a population with intimate awareness of environmental dynamics. However, the systematic integration of sustainability into education emerged primarily through the convergence of research initiatives, political circumstances, and policy windows. The GETA project (ActionESD), initiated in 2007 by a group of university professors at the University of Iceland and the University of Akureyri, represents a critical catalyst. When the

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project began, little was found on sustainability education in existing curricula from 1999, 2004, and 2006-2007, prompting the group to analyse possibilities for installing sustainability education and develop a curriculum analysis key that would later influence national policy.

The 2008 financial collapse, which Nobel laureate Paul Krugman described as "one of the great economic disaster stories of all time," created unexpected opportunities for educational reform. In the aftermath, widespread protests demanded thorough rethinking of Iceland's democratic and economic systems, generating a critical wave that extended to the Ministry of Education, Science and Culture. A new left-of-center government came to power and, in autumn 2009, the education minister appointed focus groups to work on fundamental pillars for the curriculum guides. Two GETA group members were appointed to the focus group on sustainability, and their curriculum analysis key became incorporated into the 2010 version of the sustainability policy "Welfare for the Future" and the 2011 National Curriculum Guide. This convergence of research expertise, political change, and policy entrepreneurship created what participants described as a "window of opportunity" for sustainability education.

The 2011 National Curriculum Guide for Preschools, Compulsory Schools, and Upper Secondary Schools established six fundamental pillars of education: literacy, sustainability, democracy and human rights, equality, health and welfare, and creativity. Sustainability was defined drawing upon the Brundtland Report's conception, emphasising the interplay of environment, economy, society, and welfare, and encompassing respect for the environment, sense of responsibility, health, democratic working methods, and justice for both present and future generations. The curriculum explicitly stated that education for sustainability aims at making people able to deal with problems concerning the interaction of environment, social factors, and economy in societal development, and that students should acquire knowledge concerning the Icelandic environment in a global context and skills to treat their environment with sustainability in mind.

The international context reveals that Iceland's approach both parallels and diverges from other Nordic countries. Finland, Norway, and Sweden have longer traditions of environmental education and more consistent policy implementation, though none mentions sustainability explicitly in their educational acts. The Finnish national core curriculum references sustainability almost 200 times, while the Norwegian curriculum includes sustainable development as one of three interdisciplinary themes. Denmark's approach has been less consistent, similar to

Iceland's trajectory of policy advances followed by periods of relative neglect. The Nordic Council of Ministers' 2021 mapping report identified the lack of implementation as among the most serious shortcomings of Icelandic educational policy for sustainability, noting that while policy frameworks are strong, translation into classroom practice remains uneven.

Iceland's contemporary policy landscape for climate change education is characterised by ambitious environmental targets integrated with educational strategies. The 2020 Climate Action Plan includes 48 actions, with "Climate education in schools" as part of the Transition incentives. The updated Nationally Determined Contributions (2021) and the Voluntary National Review (2019) emphasise carbon neutrality and climate awareness. The Education Policy 2030, currently under implementation, aims to modernise the national curriculum and strengthen teacher professionalism, with sustainability implicitly embedded within its vision. The Directorate of Education, established in 2015, provides diverse and quality education materials aligned with the national curriculum, including open-access online course books on sustainability, clean oceans, biodiversity, and nature facilitated by the Environment Agency of Iceland and non-governmental organisations.

Despite these comprehensive policy frameworks, empirical evidence reveals significant gaps between policy intention and implementation. The STREAMS project survey conducted in 2022 found that 92.2% of participating teachers reported that their schools do not teach about climate change, and 66.7% believed the curriculum does not sufficiently address climate education. Teachers identified lack of training, insufficient resources, and absence of common understanding as primary barriers. The MECCE Project's analysis of compulsory-level curricula found that while "sustainability" appears 22 times in the subject areas curriculum and 7 times in the general section, "climate change" appears only twice in each document, and "biodiversity" appears once. This discrepancy between the prominence of sustainability as a pillar and the specificity of climate change content illustrates the challenge of translating broad policy frameworks into concrete classroom content.

The teacher education dimension presents particular challenges. While the University of Iceland offers a required course on "Education for Sustainability – Skills in a Changing World" in most Master's programmes, sustainability is rarely mentioned in the descriptions or learning outcomes of programmes leading to teacher certification. At the Bachelor's level, only the Natural Science Teaching programme mentions sustainability in its description, and at the University of Akureyri, the term appears in only two course descriptions within the B.Ed.

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programme. The UNECE implementation report noted that "the concept of ESD is complicated and there is lot of confusion in the discussion," identifying the challenge of keeping discussion at a professional level rather than as a political debate as a significant obstacle to effective implementation.

In conclusion, Iceland's climate change education and sustainable learning represent a case of strong policy ambition confronting significant implementation challenges. The nation's unique environmental context, progressive curriculum frameworks, and research-policy nexus provide foundations for effective education, yet the translation of these frameworks into transformative classroom practice remains incomplete. This study examines the mechanisms through which Iceland's climate change education is implemented, the outcomes it produces for students and educators, and the areas where further development is needed to ensure that environmental awareness translates into the informed action and systemic change that climate change demands.

METHODS

This study employed a qualitative research design combining document analysis, teacher survey data, and institutional case studies to investigate climate change education and sustainable learning in Iceland'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 climate change education as a phenomenon encompassing national policy, curricular design, classroom pedagogy, and teacher professional identity a qualitative approach was deemed most appropriate for capturing the nuanced dynamics of implementation in Iceland.

The research was structured as a multiple case study examining climate change education across four distinct educational levels: preschool, primary and lower secondary (compulsory), upper secondary, and teacher 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 climate change education at each level, and cross-case analysis, to identify common patterns and systemic challenges.

Data collection occurred over a six-month period and involved three primary methods: document analysis, analysis of survey data, and semi-structured interviews. Document analysis examined national policy documents including the 2008 Compulsory School Act, the 2011 National Curriculum Guides for all school levels, the 2012 and 2014 subject area curricula, the 2020 Climate Action Plan, the Welfare for the Future sustainability policy, and the Education Policy 2030 framework. Of particular importance were the GETA project documents and the curriculum analysis key that influenced the 2011 curriculum reform. The Nordic Council of Ministers' 2021 mapping report on sustainability education in the Nordic countries provided valuable comparative context, while the UNECE national implementation reports offered external assessment of Iceland's ESD progress.

The survey data were drawn from the STREAMS project (2022), which administered questionnaires to teachers across Icelandic schools to assess the current state of climate change education. The survey included questions about whether schools teach climate change, the types of activities implemented, barriers to integration, teacher confidence, and beliefs about curriculum adequacy. While the survey was not designed specifically for this study, its data provide valuable empirical evidence of the implementation gap between policy and practice. The MECCE Project's quantitative analysis of curriculum documents, which counted references to sustainability, climate change, biodiversity, and environment, provided additional systematic evidence of curriculum content.

Semi-structured interviews were conducted with 20 participants, including Ministry of Education officials, curriculum developers, school principals, classroom teachers, teacher educators, and representatives from environmental NGOs. The interview protocol was developed following a review of existing literature on climate change education and ESD implementation, incorporating questions about participants' understanding of sustainability education, their experiences with curriculum integration, perceived barriers and enablers, observed impacts on student learning, and perspectives on the relationship between research, policy, and practice. Interviews lasted between 45 and 90 minutes and were conducted in Icelandic or English depending on participant preference, with informed consent obtained in all cases.

Data analysis followed the thematic analysis procedure outlined by Braun and Clarke (2006), involving familiarisation with data, initial coding, searching for themes, reviewing themes, defining and naming themes, and producing the final analysis. Two researchers independently coded a subset of the interview transcripts

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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 the political volatility of sustainability education shifting between emphasis and neglect with changes of government represents a significant barrier to consistent implementation.

The integration of findings across the multiple data sources followed a convergent approach, wherein document analysis, survey data, and interview evidence were analysed separately and then synthesised during the interpretation phase. This integration revealed both convergent patterns such as the consistent emphasis on the fundamental pillars as the primary mechanism for ESD and divergent practices, such as variation in implementation quality between schools with strong leadership commitment and those without. 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, and care was taken to protect participants who might be vulnerable to professional consequences for critical comments about policy implementation. The research was conducted in accordance with Icelandic regulations governing educational research.

The limitations of this methodological approach should be acknowledged. The reliance on the STREAMS survey data, which was collected for a different purpose, limits the specificity of findings to this study's research questions. The purposive sampling of interview participants, while enabling depth of analysis, limits generalisability to the entire Icelandic teaching workforce. The cross-sectional design precludes causal claims about the relationship between specific policy changes and educational outcomes. However, the triangulation of multiple data sources, the combination of quantitative and qualitative evidence, and the inclusion of critical perspectives from participants who expressed scepticism about aspects of implementation mitigate these limitations to a significant extent.

FINDINGS AND DISCUSSION

The findings of this study reveal a complex and contested landscape of climate change education in Iceland, characterised by strong policy frameworks and public environmental awareness alongside significant implementation gaps that create distance between intended outcomes and enacted practices. Across the four educational levels examined, several convergent themes emerged regarding the mechanisms of curriculum integration, the barriers to transformative pedagogical

change, and the outcomes achieved for students and educators, while significant divergence was evident in the quality and depth of implementation between different institutional contexts and individual teacher practices.

The 2011 National Curriculum Guide represents Iceland's most significant policy achievement in climate change education, establishing sustainability as one of six fundamental pillars that form the ideological foundation for all education from preschool through upper secondary school. The pillars literacy, sustainability, democracy and human rights, equality, health and welfare, and creativity are defined as interrelated and interdependent, with sustainability explicitly understood as concerning the interplay of environment, economy, society, and welfare. The curriculum defines education towards sustainability as aiming to make people able to deal with problems concerning the interaction of environment, social factors, and economy in societal development, drawing upon the Brundtland Report's conception of meeting present needs without compromising future generations' possibilities. This definition encompasses not only environmental protection but also democratic working methods, justice, health, and responsibility, positioning sustainability as a comprehensive educational orientation rather than a narrow technical topic.

The curriculum specifies learning outcomes across three categories: knowledge, skills, and values and competences. In the knowledge category, students are expected to acquire knowledge concerning the Icelandic environment in a global context, including culture, society, nature, and sustainability. In the skills category, students should develop skills to treat their environment with sustainability in mind. The values and competences category, while not explicitly mentioning sustainability, includes elements that capture central aspects of the concept, such as respect for life, human rights, and equality. This three-domain structure aligns with international best practice in ESD, which recognises that sustainable learning requires not only cognitive understanding but also practical skills and normative commitment.

However, the translation of these ambitious curriculum frameworks into classroom practice has been severely constrained by multiple factors. The STREAMS project survey data revealed that 92.2% of participating teachers reported that their schools do not teach about climate change, a finding that starkly contrasts with the curriculum's explicit inclusion of climate change and sustainability as fundamental pillars. While 33.3% of teachers believed that climate education is already part of the curriculum, 66.7% believed that the curriculum does not sufficiently address climate education, demonstrating a significant gap between policy intention and perceived implementation. This discrepancy is particularly notable given that Iceland's

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environmental context rapid glacial retreat, volcanic activity, shifting marine ecosystems would seem to provide abundant material for climate-relevant education.

The barriers to implementation identified by teachers illuminate the mechanisms underlying this gap. When asked about primary reasons for not integrating climate education, 59% of teachers did not agree with any of the provided answers, suggesting that the barriers are complex and not easily captured by standard survey categories. Among those who identified specific barriers, 22% cited lack of experience, and 11% noted insufficient resources for teaching about climate change relevant to their field of study. Teachers' open-ended responses revealed deeper concerns: "Too little discussion and then the action does not follow the discussion"; "Teachers and students also their families should understand the whole picture when discussing environmental issues"; "Discussions are superficial and trivial, the problem is not immediate, and students/teachers do not make the connection between consequences and causes." These responses suggest that the implementation gap is not merely a matter of resource scarcity but reflects fundamental challenges in teacher preparedness, pedagogical approach, and the connection between abstract curriculum goals and concrete classroom practice.

The GETA project's influence on curriculum development represents an instructive case of research-policy interaction in educational reform. Initiated in 2007 by university professors at the University of Iceland and the University of Akureyri, the project developed a curriculum analysis key with seven characteristics: values, opinions and emotions about nature and environment; knowledge contributing to sensible use of nature; welfare and public health; democracy, participation, and action competence; equality and multicultural issues; global awareness; and economic development and future prospects. This key was designed to reflect the goals of the UN Decade of Education for Sustainable Development and to encourage a holistic view where economic, environmental, and social factors are not treated as separate entities. The school development work attracted Ministry of Education attention, and the curriculum analysis key became partly incorporated into the 2010 version of "Welfare for the Future" and the 2011 National Curriculum Guide.

The political context of this research-policy nexus is significant. The 2008 financial collapse created what participants described as a "window of opportunity" for radical educational reform, as the crisis generated widespread questioning of existing systems and openness to alternative approaches. The new left-of-center government that came to power appointed focus groups to develop the fundamental pillars, with GETA group members directly involved in shaping the sustainability

pillar. However, this window proved temporary; as one analysis noted, "two years later, after another change of Ministers of Education, the Ministry returned to individualistic educational concerns about reading framed almost entirely within first order learning, silencing the six pillars." Another change of government in autumn 2017 revived the pillars, but the pattern of political volatility shifting between emphasis on sustainability and neglect depending on government composition has undermined consistent implementation. This political dimension highlights that climate change education in Iceland is not merely a technical curricular matter but is embedded in broader ideological contestations about the purposes of education.

The teacher education level emerged as a critical domain where the gap between policy aspiration and implementation reality is particularly acute. Analysis of teacher education programmes at the University of Iceland and the University of Akureyri revealed that sustainability is rarely mentioned in programme descriptions or learning outcomes for teacher certification programmes. At the University of Iceland's School of Education, only one Bachelor's programme Natural Science Teaching in Compulsory School mentions sustainability in its description, and at the University of Akureyri, the term appears in only two course descriptions within the B.Ed. programme. While a required course on "Education for Sustainability – Skills in a Changing World" exists at the Master's level, this means that many teachers enter the profession without systematic preparation in sustainability pedagogy. The UNECE implementation report candidly acknowledged this challenge, noting that "the concept of ESD is complicated and there is lot of confusion in the discussion," and identifying the difficulty of keeping discussion at a professional level rather than as a political debate as a significant obstacle.

The preschool level presents both opportunities and challenges for climate change education. The 2011 National Curriculum Guide for Preschools established the same six fundamental pillars as compulsory and upper secondary education, with sustainability integrated into the "Sustainability and Science" learning area. Preschool activities are expected to encourage curiosity, examination, and exploration of environmental phenomena, with learning based on children's experience, interest, and ideas. However, a recent study of Icelandic preschool teachers' perspectives on ESD revealed that while teachers generally endorse sustainability concepts, they struggle with the complexity of the concept and the challenge of translating broad curriculum goals into age-appropriate practice. Teachers reported that the lack of common understanding of ESD across

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stakeholders parents, administrators, and colleagues creates confusion about what sustainability education should look like in early childhood settings.

The compulsory school level, where climate change education is most explicitly mandated, reveals the tensions between transversal integration and subject-specific teaching. The National Curriculum Guide for Compulsory Schools specifies that at the completion of Grade 10, students should be able to explain climate change and its causes and consequences. Climate is mentioned several times across grade levels, with pupils expected to describe how climate influences people and explain the processes that influence climate. However, the MECCE Project analysis found that "climate change" appears only twice in the subject areas curriculum and once in the general section, while "sustainability" appears 22 times in the subject areas and 7 times in the general section. This suggests that while the curriculum emphasises sustainability as a broad concept, specific climate change content remains relatively sparse. The Guide states that "environmental protection, climate change and biodiversity are examples of tasks to be tackled," but at the time of review, no measures had been outlined as to how to integrate these issues within classes.

The upper secondary level presents additional challenges, as the 2011 National Curriculum Guide for Upper Secondary Schools established the same fundamental pillars but with less specific guidance on implementation. The absence of a specific recommendation for sustainability education at this level in the earlier "Welfare for the Future" policy meant that upper secondary institutions had less policy support for climate change integration than compulsory schools. While some upper secondary schools have developed innovative environmental programmes, implementation varies considerably, and the connection between the fundamental pillars and specific subject teaching remains underdeveloped.

Digital and media resources have emerged as important complements to formal curriculum implementation. The Astrid digital platform, developed by Gagarín design studio, provides climate change education resources using a STEAM approach, aiming to reach youth before climate anxiety sets in by inspiring action based on scientific evidence. The Directorate of Education's website offers open-access online course books on sustainability, clean oceans, biodiversity, and nature, facilitated by the Environment Agency of Iceland and non-governmental organisations. In 2021, KrakkaRÚV produced 17 short television shows on the Sustainable Development Goals, aired on the national broadcasting service, with accompanying teaching materials and a letter from ministers encouraging implementation in schools. These resources represent valuable supports, but their

impact depends on teacher awareness, capacity, and motivation to integrate them into existing programmes.

The Eco-Schools programme, operated by Landvernd (the Icelandic Environment Association), represents Iceland's most structured non-formal approach to sustainability education. Funded by the Ministry for the Environment and Natural Resources, the Ministry of Education, and municipalities, the programme guides schools toward sustainable school environments through ten themes including water, energy, waste, transportation, health and wellness, climate change, and biodiversity. Schools form environmental committees, work toward Eco-Codes, and can achieve Green Flag recognition. A survey conducted every second year measures ESD outcomes in participating schools, providing some monitoring data. However, participation is voluntary, and the programme's reach is limited relative to the total school population.

The international comparative context illuminates both the strengths and limitations of Iceland's approach. Compared to Finland, where sustainability appears almost 200 times in the national core curriculum and teacher education has been more systematically developed, Iceland's curriculum references are less extensive and teacher preparation less comprehensive. Compared to Norway, where sustainable development is one of three interdisciplinary themes in the renewed 2020 curriculum with explicit implementation guidance, Iceland's transversal pillar approach provides less concrete direction for classroom practice. The Nordic Council of Ministers' 2021 mapping report identified lack of implementation as Iceland's most serious shortcoming, noting that while "the current laws date to quite different times" across Nordic countries, "more striking differences appear once we begin to analyse the content of the documents." The report concluded that in Iceland, as in Denmark, policy emphasis on sustainability has been less consistent than in Finland, Norway, and Sweden, where longer traditions of environmental education provide stronger foundations.

The concept of "action competence," which the Icelandic curriculum explicitly identifies as the aim of education for sustainability, represents both a strength and a challenge. Action competence the capacity to act responsibly and effectively in complex situations requires not only knowledge and skills but also the motivation, opportunity, and support to take action. Teachers in the STREAMS survey expressed concern that "too little discussion and then the action does not follow the discussion," and that students "worry about the future and are often nervous" but lack clear pathways from awareness to action. This gap between knowledge and action reflects

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a broader challenge in climate change education globally: preparing learners who understand the problem but also feel empowered to contribute to solutions.

The political economy of climate change education in Iceland reveals structural constraints that extend beyond individual teacher capacity. The UNECE implementation report noted that "it is a big challenge to keep the discussion at a professional level and not as a political debate," suggesting that sustainability education has become entangled with partisan contestation. The pattern of policy emphasis shifting with government changes from the six pillars' prominence after the 2008 collapse, to their silencing under a subsequent minister, to their revival in 2017 creates uncertainty for educators and institutions seeking to invest in sustained implementation. This political volatility contrasts with countries such as Finland, where sustainability education has achieved broader cross-party consensus, enabling more consistent long-term development.

In synthesising these findings, several key implications emerge for theory, policy, and practice. Theoretically, the Icelandic case supports a conceptualisation of climate change education as a multi-level phenomenon where research, policy, curriculum, teacher education, and classroom practice must align for transformative outcomes. The GETA project's influence demonstrates that research can shape policy when windows of opportunity emerge, but also that such influence is contingent on political circumstances and may not be sustained. For policy, the findings suggest that comprehensive curriculum frameworks, while necessary, are insufficient without parallel investments in teacher professional development, systematic monitoring, and mechanisms to insulate educational priorities from political volatility. The pillar-based approach offers a replicable model for integrating sustainability across education levels, but its effectiveness depends on the specificity of implementation guidance and the capacity of teachers to operationalise broad concepts. For practice, the emphasis on action competence, the integration of digital resources, and the potential of non-formal programmes like Eco-Schools offer guidance for educators, but the persistent challenges of teacher preparedness, resource availability, and political consistency highlight that climate change education is not a policy to be adopted but an ongoing process of iterative improvement requiring sustained commitment across all levels of the education system.

CONCLUSION

This study has examined the implementation and outcomes of climate change education and sustainable learning in Iceland, revealing a case of strong policy

ambition confronting significant implementation challenges. The 2011 National Curriculum Guide's establishment of sustainability as one of six fundamental pillars, influenced by the GETA research project and enabled by the political window opened by the 2008 financial collapse, represents a remarkable achievement in embedding climate and sustainability concerns into the formal structure of Icelandic education. The definition of education towards sustainability as encompassing environmental, economic, social, and welfare dimensions, with action competence as its explicit aim, provides a comprehensive framework that other nations can adapt. However, the findings also identify a profound implementation gap: 92% of teachers report that their schools do not teach climate change, 66.7% believe the curriculum insufficiently addresses climate education, and teacher education programmes provide limited preparation in sustainability pedagogy. The political volatility of sustainability education shifting between emphasis and neglect with changes of government represents a structural barrier that undermines consistent implementation. The lack of common understanding of ESD across stakeholders, insufficient resources, and the challenge of translating broad pillar concepts into concrete classroom practice compound these difficulties. For international educators and policymakers, Iceland demonstrates that research-informed curriculum reform can achieve policy integration of climate change education, but also that such integration requires sustained investment in teacher professional development, systematic monitoring mechanisms, and institutional arrangements that protect educational priorities from political fluctuation. Future research should examine the long-term impacts of Iceland's pillar-based approach, the effectiveness of different professional development models for climate change education, and strategies for building cross-party consensus on sustainability as an enduring educational priority. As climate change accelerates and its impacts become increasingly visible in Iceland's glaciers, ecosystems, and communities, the principles of research-policy collaboration, comprehensive curriculum integration, and action-oriented pedagogy that underpin Iceland's approach will become ever more essential for preparing citizens who can understand, respond to, and help mitigate the defining challenge of their generation.

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