

International Journal of Early Childhood Environmental Education

Addressing Policy, Practice, and Research That Matters

Yash Bhagwanji, Editor

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International Journal of Early Childhood Environmental Education

Addressing Policy, Practice, and Research That Matters

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International Journal of Early Childhood Environmental Education

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EDITORIAL NOTE

Advancing Policy, Practice, and Research in Early Childhood Environmental Education: Helpful Information for Writing Research to Practice Briefs

Yash Bhagwanji

Florida Atlantic University, USA

Christine Kiewra

University of Nebraska - Lincoln, USA

Writing research briefs is not a usual part of academic and research training, nor is it a usual activity engaged by teacher educators, researchers, or other personnel in institutions of higher education. There are many benefits in writing research briefs, however. Writing research briefs can broaden a researcher's portfolio, increase the research's impact by disseminating findings to new readers, including historically marginalized communities, and strengthen partnerships with community stakeholders (Institute of Education Sciences, 2021). As the role of research in enhancing policy, suggesting licensing recommendations, instigating further research, recommending program operation changes and improvements, and improving curricular and teaching practices are particular goals of both IJEECE and Exchange Magazine, we invite authors of original published research as well as authors collaborating with original research authors in submitting Research to Practice Briefs for peer-reviewed publication in IJEECE.

The Institute of Education Sciences (2021) offers a guide to writing effective research briefs. IJEECE and Exchange Magazine share the definition of a *research brief* provided by the staff of the institute, described below:



What Exactly *IS* a Research Brief?

A research brief is a concise, non-technical summary of the key takeaways from a research study. Briefs communicate research insights to the public, thereby translating research and evidence-based practices into real-world settings.

The focus of a brief varies depending on the intended audience., Provide explicit recommendations for practice if you want to reach a practitioner audience. Explore policy and infrastructure needs when writing for a policymaker audience.

Plan to share briefs in diverse settings. Share briefs with research partners (participating districts, schools, teachers), professional networks (at conference presentations), and broader audiences (on personal websites).

Source: <https://ies.ed.gov/learn/blog/being-brief-skills-and-supports-translating-research-practice-brief-reports>

Be sure to check out the many examples of research briefs provided on the institute's website:

<https://www.pbismaryland.org/resources/research-briefs>. The examples provide a variety and many models as possibilities.

FOCUS AND PARAMETERS OF RESEARCH TO PRACTICE BRIEFS

Specific to **International Journal of Early Childhood Environmental Education**, we invite Research to Practice Briefs focused on early childhood environmental education, early childhood education for sustainability, nature-based early education, nature-based early learning, and/or related constructs, contexts, and topics that encompass children and their caregivers in conservation education, environmental civic engagement, environmental education, environmental literacy development, nature-based learning experiences, science education, sustainability education, and many other relevant and intersecting or related ideas. IJECCE also invites research briefs that focus on program development and operations as well as policies at multiple levels focused on the forementioned considerations. The research briefs should be between 750 and 850 words, not counting author references and headings. Should a research brief be accepted for publication in IJECCE, the brief will be formatted to fit in two published pages.

In this issue, you will find the journal's first published research to practice brief. The brief was organized around four areas that flowed from important descriptions of the research study (challenge or problem statement, and research approach and methodological information) to practical information (key findings, and recommendations for practice). This format likely represents an option for future research to practice briefs in IJECCE, although distinct possibilities are open of other creative organizations of the briefs. Each brief submission's structure will be considered based on the principal focus of the original published article (e.g., policy, program development, research).

Specific to **Exchange Magazine**, author(s) with accepted or published IJECCE research briefs will be invited to write extended versions for **Exchange Community Voices** online platform. Authors who accept this invitation will collaborate with Exchange Bridging Research and Practice Advisory Team to expand application of their research for a practitioner audience. Exchange Advisors will offer written reflections with application examples from their own professional context including educators, teacher educators, and program administrators. Ultimately authors will submit their Bridging Research to Practice article and grant permission for Exchange to publish it.

AUTHOR PARAMETERS

We invite authors of original research, authors collaborating or partnering with original authors, as well as authors with permission from original study authors to submit research to practice briefs for publication in IJECCE and Exchange Magazine. For the latter, authors are required to acknowledge that permission was granted by the original researchers along with a full citation of the published studies in the research briefs.

SOURCES OF ORIGINAL RESEARCH OR STUDIES

Ideally, the sources of original research studies should be dissertations or theses reviewed and approved by faculty committees or published research in scholarly journals reviewed and accepted by peers with expertise in early childhood environmental education and/or related areas. Sources must be fully referenced in the Research to Practice Briefs. The editors are also open to research briefs encompassing other forms of peer- and/or faculty-reviewed original studies such as action research papers and other types of research-based papers completed and graded as part of academic course assignments.

OTHER CONSIDERATIONS FOR FLOW OR STRUCTURE OF RESEARCH BRIEFS

It would be useful to start with a short description of the study along with a full citation. Ensure use of accessible language that is tailored to your audience(s). The short description describes the research's problem statement and/or research questions. Express your interest (or interest of the field at large) on the topics addressed and acknowledge author(s) and their work.

Following the short description, provide a succinct summary of the participants, settings, research design, study procedures and data collection, and analysis approach. Relatedly, it will be important and useful to present the delimitations of the original study (i.e., parameters describing critical inclusions and exclusions).

Next describe the significant findings of the original research. Use non-technical and easy-to-follow explanations that maintain the fidelity of the original and described findings. Be succinct and parsimonious at the same time. If there were identified limitations of the study, it would be important to mention it in clear terms.

The spotlight or focal point of the research brief should be restatements of original author implications - and your own more contextualized applications and implications in theory, research, practice, and/or policy, emphasizing practical examples for indoor and outdoor teaching and guidance, program practices, setting designs, affordances of nature-based education in early childhood experiences, and more.

You may add a meaningful and short remark to close the research to practice brief.

SUBMISSION PROCESS

Please submit research to practice briefs to Yash Bhagwanji (IJECEE Editor, ybhagwan@fau.edu) and Christine Kiewra (Exchange Bridging Research and Practice Advisory Team Coordinator, ckiewra2@unl.edu).

REVIEW AND FEEDBACK PROCESS

Following the submission of research to practice brief, reviewers composing of peers and experts on the topics addressed will be invited to review and provide suggestions, recommendations, and decisions for the research brief. Up to two rounds of reviews will be available, following which the research to practice brief may either be accepted or rejected.

References

- Institute of Education Sciences (retrieved June 12, 2026), On Being Brief: Skills and Supports for Translating Research to Practice via Brief Reports. <https://ies.ed.gov/learn/blog/being-brief-skills-and-supports-translating-research-practice-brief-reports>.
- PBIS Maryland (retrieved June 12, 2026). Research Briefs. <https://www.pbismaryland.org/resources/research-briefs>.

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Children's Rights and Environmental Education in Early Childhood: Policy Insights from China's Eco-Civilisation and ASEAN under the CRC–SDG–GC 26 Framework

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ABSTRACT

This article examines how children's rights are reflected in early childhood environmental education (ECEE) policy in China and ASEAN through the normative lens of the UN Convention on the Rights of the Child (CRC), General Comment No. 26 (2023), and the Sustainable Development Goals (SDGs). Drawing on a qualitative analysis of 42 policy documents, it compares China's eco-civilisation agenda with regional and national sustainability-related frameworks across ASEAN. The analysis shows that China has developed a more coherent policy architecture by linking sustainability to curriculum, teacher preparation, and institutional practice. Even so, children's participation rights, especially under CRC Article 12, remain weakly articulated. In ASEAN, policy language is often more open to participation and inclusion, but implementation is uneven and regional commitments are seldom enforceable. Across both contexts, provision and protection rights are expressed more clearly than participation rights. The article argues that ECEE policy is strongest when children are treated as recipients of environmental knowledge but becomes less assured when they are recognised as present rights-holders whose views should help shape educational responses to ecological change. By bringing China and ASEAN into the same analytical frame, the study offers a rights-based approach to comparative ECEE policy and points to the need for models that combine policy coherence with meaningful child inclusion.

Keywords: early childhood environmental education, children's rights, Sustainable Development Goals (SDGs), ASEAN

The climate crisis is no longer a distant issue in children's lives. It is already shaping the environments in which young children grow, learn, and play, and it does so unevenly across social and national contexts. For that reason, environmental education in early childhood can no longer be treated simply as an optional area of curriculum enrichment. It needs to be understood as part of a broader rights-based response to ecological risk. General Comment No. 26 (2023) of the UN Committee on the Rights of the Child makes this point clear by affirming that a clean, healthy, and sustainable environment is necessary for the realisation of children's rights. In policy terms, this moves environmental learning from the margins of educational debate to the centre of questions about protection, development, participation, and justice.

This study begins from that premise. It asks not only whether sustainability language appears in policy, but also how children are positioned within it. Are young children understood mainly as future citizens who must be prepared for environmental crisis, or as present rights-holders whose interests, protection, learning, and participation should shape policy now? Although a growing body of scholarship addresses early childhood education for sustainability, fewer studies examine how policy frameworks translate children's rights obligations into the governance of early childhood environmental education (Howell, 2022; Lundy & McEvoy, 2012; Savelyeva, 2024). The gap is particularly evident in comparative work across Asian contexts.

China offers an especially important case. Through the language of eco-civilisation, sustainability has been embedded in a wider state project linking environmental responsibility with national development and social transformation. This agenda has shaped curriculum design, teacher preparation, and school-based initiatives, including green school programmes and local pilots in provinces such as Zhejiang and Guangdong (Zhou, Liu, Han, & Wang, 2016; Liu, Jiang, & Li, 2022; Gao, 2022). The scale and policy coherence of this approach make China highly significant for comparative work in early childhood environmental education. At the same time, strong system design does not in itself resolve questions of child agency, equity, or participation. These are precisely the issues that become more visible when China is examined through the CRC and GC 26.

To make the evidentiary basis for the China case more transparent, Table 1 summarises the principal national and ministerial policy documents that anchor the analysis of eco-civilisation in early childhood education.

Table 1. Key Chinese Policy Documents Underpinning the Analysis of Eco-Civilisation in ECEE

Document	Year	Institutional Source	Relevance to the Analysis
Guidelines on Promoting Eco-Civilisation Education	2019	Ministry of Education of the People's Republic of China	Foundational directive embedding eco-civilisation in the education sector.
National Curriculum Standards for Early Childhood Education	2020	Ministry of Education of the People's Republic of China	Provides the baseline early childhood curriculum framework used to assess sustainability integration.
Action Plan on Environmental Literacy for Young Learners	2020	State Council of the People's Republic of China	Sets environmental literacy benchmarks for young learners and links them to national policy goals.
Eco-Civilisation Curriculum Reform Pilot Report	2021	Ministry of Education of the People's Republic of China	Shows how eco-civilisation principles were piloted in curriculum implementation.
Children and Climate Resilience Strategy	2021	Ministry of Ecology and Environment of the People's Republic of China	Provides child-centred policy language on resilience, protection, and environmental risk.
China's National Plan on Ecological and Environmental Protection (2021–2025)	2021	State Council of China	Supplies the broader strategic policy context for ecological governance across sectors, including education.
Green Development in the Education Sector	2022	National Development and Reform Commission	Links the green development agenda to education-sector priorities and institutional planning.
White Paper on the Green Schools Initiative	2022	Ministry of Education of the People's Republic of China	Illustrates school-level operationalisation of sustainability and institutional practice.

*Note: This table is intended to provide a concise evidentiary counterpart to the ASEAN country comparison and document–country mapping. It identifies the principal Chinese policy documents that anchor the analysis of eco-civilisation in early childhood education without reproducing the fuller corpus already listed in Appendix A.

The Association of Southeast Asian Nations (ASEAN) provides a useful comparative frame. Established in 1967, ASEAN is a regional intergovernmental organisation that, during the study and review period relevant to this manuscript, comprised ten member states: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. Although it is often associated with economic and political cooperation, ASEAN has also developed policy agendas in education, social welfare, child protection, and sustainable development. These shared agendas make ASEAN relevant to the present study. At the same time, ASEAN is not a uniform policy space. Member states differ substantially in institutional capacity, environmental vulnerability, curriculum reform, and the extent to which sustainability is integrated into early childhood provision. That diversity makes ASEAN useful not as a competing focal case, but as a comparative mirror that helps clarify what is distinctive about China’s model. At the time this manuscript entered review in August 2025, Timor-Leste had not yet been formally admitted as a full ASEAN member. Its formal admission took place later, on 26 October 2025. Accordingly, the comparative analysis in this article reflects the ten-member ASEAN configuration applicable to the study corpus and review period.

Within ASEAN, some countries have moved further than others in linking sustainability and early childhood education. Singapore has integrated green competencies into broader education and development agendas, Malaysia has incorporated sustainability into curriculum reform, and Vietnam has increasingly linked early childhood provision to climate adaptation and resilience (Lim et al., 2024; Rahman & Othman, 2021; Tran, 2023; Nguyen & Le, 2025). Yet the regional picture remains uneven. ASEAN declarations and action plans signal broad commitment, but implementation depends largely on national uptake and remains shaped by consensus-based regional governance. Participation, accountability, and enforceability therefore vary considerably across the region. To make this variation more visible, Table 2 summarises the broad status of ECEE-related policy development across all ten ASEAN member states, while Table 3 maps the documentary basis on which the ASEAN comparison is built.

These differences matter because GC 26 does more than call for environmental awareness. It places environmental policy in direct relation to the four general principles of the CRC: non-discrimination, the best interests of the child, survival and development, and participation. In early childhood settings, these principles raise practical as well as normative questions. Do policies address unequal exposure to environmental harms? Do they build child-sensitive protections in response to floods, haze, or extreme heat? Do they treat children only as learners to be guided, or also as social actors whose perspectives matter in sustainability-related education? Framed in this way, early childhood environmental education becomes a question not only of curriculum content, but also of how states understand children, governance, and responsibility.

Against this background, the article asks: How does China’s eco-civilisation align with CRC-based environmental rights under GC 26, and what additional insights emerge from ASEAN comparisons? To address this question, the study draws on a qualitative document analysis of 42 policy texts and authoritative reports, examining how rights language, sustainability priorities, and governance mechanisms are articulated across China and ASEAN-related contexts.

The article makes three contributions. First, it situates China’s eco-civilisation reforms within global children’s rights discourse, clarifying their alignment with GC 26 and highlighting both their strengths and their limitations for Chinese early childhood education. Second, it uses ASEAN not as a second focal case but as a comparative context, showing more clearly how China’s model stands out in terms of coherence and state-led implementation. Third, it draws out policy implications for embedding CRC principles in sustainability-oriented ECEE. Together, these contributions align with IJECCE’s mission to advance globally informed debate on early childhood environmental education. The article’s originality lies in bringing early childhood pedagogy, sustainability policy, and human rights analysis into the same frame, moving beyond description to evaluate policy against normative obligations. This framing underscores the study’s urgency and relevance for international readers concerned with child rights and sustainability.

Table 2. Comparative Overview of ASEAN Member States in Early Childhood Environmental Education

ASEAN Member State	General Status of ECEE or Early Sustainability Integration	Key Policy or Framework Orientation	Broad Goal or Emphasis	Analytical Note
Brunei Darussalam	Limited visible evidence in the reviewed corpus	Sustainability is linked broadly to education modernisation and environmental awareness	Environmental responsibility and national development	The reviewed corpus contains only limited direct evidence of an early childhood-specific ECEE framework in Brunei Darussalam
Cambodia	Limited visible evidence in the reviewed corpus	Environmental and education priorities appear more general than early childhood-specific	Basic environmental awareness and education access	Evidence of explicit early childhood environmental education integration remains limited in the reviewed documents
Indonesia	Partial to emerging integration	PAUD reform, ecological literacy, local eco-projects, and curriculum adaptation	Ecological literacy, child participation, and local sustainability practice	Indonesia provides some of the clearest examples of participatory practice, including eco-gardens, waste sorting, and locally adapted sustainability learning
Lao PDR	Limited visible evidence in the reviewed corpus	Sustainability concerns appear indirectly rather than through a clearly articulated early childhood framework	Environmental awareness within broader education and development priorities	The corpus suggests weaker formalisation of ECEE in early childhood than in the better-documented ASEAN cases
Malaysia	Partial and increasingly structured integration	Preschool curriculum standards and SDG-linked education planning	Sustainability through stories, play, projects, and teacher support	Malaysia shows stronger curricular recognition of sustainability, although classroom implementation remains uneven
Myanmar	Limited visible evidence in the reviewed corpus	Policy visibility is constrained in the reviewed documents	General education and protection concerns rather than explicit ECEE institutionalisation	The documentary basis for early childhood-specific sustainability integration is thin, suggesting limited evidence rather

Philippines	Emerging but limited evidence in the reviewed corpus	Child-centred and community-oriented education discourse with possible relevance to sustainability	Community awareness, resilience, and child development	than confirmed absence The reviewed corpus does not provide sufficiently strong or detailed evidence of a standalone ECEE framework in early childhood
Singapore	Stronger and more visible integration	Green Plan, sustainability leadership, age-appropriate projects, and policy coherence	Sustainability competencies, green citizenship, and structured educational practice	Singapore is one of the strongest ASEAN examples in the corpus, showing clearer policy alignment and more systematic implementation
Thailand	Emerging but limited evidence in the reviewed corpus	Sustainability appears within broader education and environmental agendas	Environmental awareness and community-based learning	The corpus indicates relevance, but not a strongly elaborated early childhood-specific framework comparable to Singapore or Malaysia
Vietnam	Emerging integration	Climate adaptation, preschool resilience, and teacher training initiatives	Adaptation, preparedness, and environmental awareness in early learning	Vietnam shows growing relevance in climate adaptation discourse, but system-wide integration remains less consolidated

Note. This table is designed to show variation across ASEAN member states rather than to imply equivalent levels of policy development. Categories such as stronger, partial, emerging, and limited visible evidence reflect the scope and clarity of evidence in the reviewed corpus. The table reflects the ten-member ASEAN configuration applicable to the study corpus and to the period in which the manuscript entered review in August 2025.

Table 3. Document–Country Mapping Matrix for ASEAN Member States

ASEAN Member State	Documents in Which the Country Is Mentioned or Analytically Represented	Nature of Reference	Relevance to ECEE Analysis
Brunei Darussalam	ASEAN environmental education action plan; ASEAN progress review on education for sustainable development; State of early childhood care and education in ASEAN	Regional representation	Included as part of the ASEAN-wide comparison, but without strong country-specific ECEE detail in the reviewed corpus

Cambodia	ASEAN environmental education action plan; ASEAN progress review on education for sustainable development; State of early childhood care and education in ASEAN	Regional representation	Used to illustrate uneven regional development and comparatively weaker documentary visibility in early childhood sustainability integration
Indonesia	Merdeka Belajar policy note; early childhood education development plan 2021–2025; green curriculum integration for PAUD; national SDG progress report; ASEAN progress review on education for sustainable development; State of early childhood care and education in ASEAN	Direct national documentation and regional comparison	Provides one of the clearest ASEAN cases of participatory and practice-oriented sustainability integration in early childhood settings
Lao PDR	ASEAN environmental education action plan; ASEAN progress review on education for sustainable development; State of early childhood care and education in ASEAN	Regional representation	Included primarily to demonstrate regional diversity and the uneven institutionalisation of ECEE
Malaysia	Malaysia roadmap for SDG education; preschool curriculum standards; Malaysia climate and education strategy; national preschool education blueprint; ASEAN progress review on education for sustainable development; State of early childhood care and education in ASEAN	Direct national documentation and regional comparison	Supports analysis of curriculum-level sustainability integration with ongoing implementation gaps
Myanmar	ASEAN environmental education action plan; ASEAN progress review on education for sustainable development; State of early childhood care and education in ASEAN	Regional representation	Illustrates weaker documentary evidence and limited visibility of early childhood-specific ECEE in the reviewed corpus
Philippines	ASEAN environmental education action plan; ASEAN progress review on education for	Regional representation	Included to reflect ASEAN-wide comparison, although direct country-specific ECEE evidence

	sustainable development; State of early childhood care and education in ASEAN		remained limited in the analysed documents
Singapore	National Green Plan 2030: Education chapter; Nurturing Early Learners Framework; climate change and education policy note; Children First: Rights and Environment in Early Childhood; ASEAN progress review on education for sustainable development; State of early childhood care and education in ASEAN	Direct national documentation and regional comparison	Serves as one of the strongest ASEAN examples of policy visibility, sustainability framing, and institutional coherence
Thailand	ASEAN environmental education action plan; ASEAN progress review on education for sustainable development; State of early childhood care and education in ASEAN	Regional representation	Included to demonstrate ASEAN diversity, but with less country-specific detail than Singapore, Malaysia, or Indonesia
Vietnam	Environmental education in pre-school teacher training programmes in Vietnam; climate change and children's health in Vietnam; flooding and child development: evidence from Vietnam; ASEAN progress review on education for sustainable development; State of early childhood care and education in ASEAN	Direct thematic literature and regional comparison	Supports analysis of climate adaptation and resilience in early childhood, while also showing the limits of system-wide policy consolidation

Note. This matrix is intended to strengthen traceability by showing how discussion of ASEAN member states is grounded in the reviewed documentary corpus. In several cases, countries are represented primarily through regional ASEAN documents rather than through country-specific early childhood environmental education frameworks. The matrix reflects the ten-member ASEAN configuration applicable to the study corpus and to the period in which the manuscript entered review in August 2025.

Literature Review

Child Rights and the Environment. The environment is increasingly recognised as integral to the fulfilment of children's rights. General Comment No. 26 (2023) of the UN Committee on the Rights of the Child interprets the UNCRC (1989) in the context of climate and ecological crises, affirming that access to a clean, healthy, and sustainable environment underpins children's rights to health, education, development, and play (UN Committee on the Rights of the Child, 2023). This reframing elevates environmental protection from a discretionary policy choice

to a legal entitlement. Scholars further note that children are not only acutely vulnerable to ecological risks but can also act as agents of change (Peleg, 2023). From a rights-based perspective, states must therefore embed ecological literacy, meaningful child participation, and intergenerational equity in both pedagogy and policy if they are to meet CRC obligations (Chatzifotiou & Williams, 2022).

International Perspectives on ECEE. Early childhood education for sustainability (ECEE) has emerged from global education for sustainable development (ESD) agendas, including Agenda 21, the UN Decade of ESD (2005–2014), and UNESCO’s ESD for 2030 Roadmap (UNESCO, 2020). Scholars describe ECEE as both a pedagogical innovation and a social necessity (Davis, 2010; Ärlemalm-Hagsér, 2021). Evidence shows that young children can engage meaningfully with ecological stewardship through relational and play-based learning (Kahriman-Pamuk, 2024). Comparative studies also show that approaches differ. Scandinavian systems tend to embed sustainability across curricula, whereas Anglophone contexts often treat it as a supplementary theme (Hägglund & Johansson, 2014). These contrasts reflect wider tensions between child-centred and outcome-driven education (Chan, 2024). A rights-based perspective strengthens the argument that ECEE should recognise children’s present agency rather than position them only as ‘future citizens’ (Elliott, Ärlemalm-Hagsér, & Davis, 2020).

China’s Eco-Civilisation and Early Childhood. China’s eco-civilisation (*shengtai wenming*) is a central pillar of national development, embedded in the Constitution and successive Five-Year Plans. It presents environmental stewardship as fundamental to national rejuvenation (Zhou, 2024). This vision shapes early childhood education through curriculum guidelines, teacher preparation programmes, and green school initiatives (Chen, Chen, & Chi, 2024). Urban preschools often adopt outdoor and experiential sustainability practices, whereas rural schools remain under-resourced (Zhou, 2020; Xiao, 2023). Teachers generally support eco-civilisation principles, but they also report barriers such as curriculum overload and limited professional training (Cheng & Yu, 2022). These dynamics reveal strong state commitment while also exposing uneven integration of children’s rights principles, particularly equity and participation, both of which are central to the CRC and GC 26.

ASEAN Perspectives. The ASEAN Education Work Plan 2021–2025 gives sustainability a clear place in regional priorities (ASEAN Secretariat, 2021), although implementation varies widely across member states. Singapore integrates environmental literacy into its Smart Nation agenda, with preschools adopting both nature-based and digital practices (Elder & Ellis, 2023; Tan & Yang, 2022; Seow et al., 2019). Malaysia’s curriculum incorporates sustainability principles, but classroom practice remains inconsistent because of gaps in teacher capacity (Heng, Phang, & Siew, 2024). In Vietnam, UNICEF- and UNESCO-supported pilots on climate change and disaster preparedness have been introduced, yet systemic integration remains limited (Pham, 2023). Given ASEAN’s acute vulnerability to climate hazards, these disparities are especially concerning. Regional reviews consistently call for harmonisation through shared benchmarks and collaborative initiatives (Hallinger, 2024). Even so, rights-based evaluation remains limited in ASEAN contexts.

Research Gap

Despite important progress, substantial gaps remain. In China, scholarship tends to emphasise eco-civilisation without systematically assessing its alignment with CRC obligations or General Comment No. 26. In ASEAN, promising initiatives are acknowledged but are rarely evaluated through a rights-based lens. Comparative analyses between China and ASEAN remain scarce, despite their shared vulnerabilities and influence in global education discourse. In addition, critical issues such as child participation, equity, and the best interests of the child remain underexplored, while research continues to focus disproportionately on curriculum design and teacher readiness. Addressing these gaps requires a framework that brings together child-rights law, sustainability pedagogy, and policy analysis. This article develops such a framework and, in doing so, contributes both to ECEE scholarship and to wider children’s rights debate.

METHODOLOGY

This study employed a qualitative comparative policy analysis to examine how children’s rights, as articulated in the United Nations Convention on the Rights of the Child (CRC) and reflected in the Sustainable Development Goals

(SDGs), are integrated into early childhood environmental education (ECEE) frameworks in China and ASEAN. The research was situated within an interpretivist paradigm, recognising that policies are socio-political constructs shaped by cultural, ideological, and institutional priorities rather than neutral directives. The aim was to examine the extent to which rights-based discourse is institutionalised, integrated, or marginalised within the governance of ECEE and wider sustainability initiatives. The Chinese case, with its eco-civilisation paradigm, was foregrounded in order to generate comparative insight into the relationship between global children's rights standards and national policy priorities. ASEAN was included not as a co-equal focus but as a comparative mirror, offering contextual depth and highlighting the distinctiveness of China's governance model. For added traceability, Table 1 identifies the principal Chinese national and ministerial documents that underpin this part of the analysis.

The corpus comprised 42 policy frameworks and authoritative reports identified through purposive sampling. This was considered sufficient to capture the diversity of national and regional policy frameworks while remaining analytically manageable. Thematic saturation was reached at 42 documents, as no substantively new codes emerged after the thirty-ninth. The corpus included national policy documents, strategic frameworks, regional agreements, and international reports published between 2019 and 2024. This period was chosen to capture developments following General Comment No. 25 (2021) on children's rights in relation to the digital environment and General Comment No. 26 (2023) on children's rights and the environment, as well as ASEAN's Regional Plan of Action on Eliminating Violence against Children (2022–2030). Sources included education plans, sustainability strategies, curriculum guidelines, and publications from international organisations such as the United Nations, UNESCO, UNICEF, and the ASEAN Secretariat. Chinese documents were accessed through the Ministry of Education and related government agencies, while ASEAN sources included communiqués, declarations, and sectoral plans from Indonesia, Malaysia, and Singapore. All Chinese-language materials were analysed in their officially published Mandarin versions and cross-checked against government-approved English translations where necessary. A full list of the 42 documents, together with the coding framework and excerpts from the coding matrix, is provided in the Appendix to support transparency and replicability.

To strengthen rigour, explicit inclusion and exclusion criteria were applied. Documents were included if they (a) were produced by recognised governmental or intergovernmental authorities, such as national ministries, the ASEAN Secretariat, or UN agencies; (b) were published between 2019 and 2024 in English, Mandarin, or an official translation; (c) explicitly addressed early childhood, environmental or sustainability education, or children's rights; and (d) showed clear relevance to the CRC–SDG nexus. Opinion pieces, non-academic sources, duplicated or superseded texts, and documents outside the scope of ECEE were excluded. Preliminary ASEAN working papers without formal endorsement were also excluded, as were local pilot reports that did not reflect national or regional commitments. This screening process ensured that the final selection was both authoritative and appropriate to the study's purpose.

Document analysis served as the principal method and drew on Bowen's (2009) systematic approach. Two complementary frameworks guided the analysis. First, comparative education methodology, as articulated by Bray, Adamson, and Mason (2014), highlighted the role of context, culture, and structure in shaping policy trajectories. Second, children's rights-based research principles (Lundy & McEvoy, 2012; Byrne & Lundy, 2019) provided normative alignment with the CRC, especially in relation to non-discrimination, protection, participation, and provision rights. The coding framework was developed deductively from CRC Articles 6, 12, 24, 28, and 29 and relevant SDG targets 3, 4, 11, 12, 13, and 16.7, and was then refined inductively to incorporate emergent themes such as eco-civilisation ideology, participatory gaps in education, and sustainability competencies. Refinement took place across repeated readings of the corpus: initial codes were trialled, revisited after two further cycles of reading, and then consolidated into thematic clusters.

The analysis unfolded in four stages. First, potential documents were identified and catalogued from official repositories. Second, documents were screened against the inclusion and exclusion criteria, and duplicates or superseded versions were removed. Third, initial coding was anchored in the CRC–SDG framework. Fourth, iterative refinement and cross-case synthesis were used to compare patterns across China and ASEAN and to identify key convergences and divergences.

Reliability and validity were addressed through complementary strategies. Coding and thematic organisation were supported by an audit trail of memos and matrices so that analytical decisions remained traceable. Peer debriefing with two academic colleagues was used to test category boundaries and interpretations. In addition, a subset of eight documents was double-coded to assess intercoder consistency, yielding agreement levels comparable to Cohen's kappa values above 0.80 (McHugh, 2012). Although full intercoder reliability was not feasible given the interpretivist and document-based nature of the study, trustworthiness was strengthened through the audit trail, peer debriefing, and explicit reporting of coding decisions.

Ethical considerations were integral throughout. Although the study did not involve human participants, ethical obligations in children's rights research (Graham et al., 2015) were observed in order to ensure accurate and respectful representation of children's interests as articulated in policy texts. Reflexivity was maintained through explicit acknowledgement of the researcher's positionality as both a scholar and an advocate for child rights within environmental education policy discourse. This reflexive stance helped reduce potential bias and strengthen the validity of interpretation.

This study does not include classroom observations or interviews. That absence reflects a methodological choice rather than a weakness. The unit of analysis is policy itself, treated as the primary source for understanding how children's rights are positioned within sustainability discourse. This design highlights macro-level governance patterns and is intended to complement, rather than replace, micro-level or ethnographic inquiry. By placing children's rights analysis within a comparative education frame, the methodology contributes directly to debate in ECEE policy research, especially in relation to how rights-based discourse is institutionalised within sustainability and environmental education frameworks.

Findings: Policy Pathways, Rights Integration, and Sustainability in ECEE

This section presents the comparative findings on China's and ASEAN's approaches to early childhood education for sustainability (ECEE), drawing on policy documents, coding excerpts, and the CRC–SDG–GC 26 analytical frame. It highlights the main points of convergence and divergence and considers their implications for the realisation of children's rights.

Policy Convergences Across China and ASEAN

China and ASEAN increasingly position sustainability within early childhood policy. China's Ecological Civilisation Curriculum Guidelines (2022) frame environmental stewardship as integral to socialist modernisation, while Singapore incorporates sustainability through its Sustainable Development Blueprint (2022). Indonesia promotes ecological literacy in locally adapted PAUD programmes (Ministry of Education, Culture, Research, and Technology [MoECRT], 2022). At the regional level, ASEAN affirms sustainability through the *State of Early Childhood Care and Education in ASEAN* report (UNICEF, 2022), in a manner broadly consistent with UNESCO's Education for Sustainable Development Roadmap (2022). The common ground lies in recognising sustainability as a legitimate concern within ECEE and in aligning it with wider global frameworks. Even so, China interprets sustainability through a more state-centric paradigm (Zhou, 2024; Li, Xi, & Zhu, 2022). Provision rights under CRC Articles 6 and 24 are therefore prioritised more clearly than participation rights under CRC Article 12, raising questions about compliance with GC 26's emphasis on participatory environmental education.

Divergences: Ideological and Structural Contrasts

The differences between China and ASEAN reflect contrasting governance logics. China links eco-civilisation to national rejuvenation, presenting sustainability as a civic and patriotic duty while leaving limited space for children's agency (Xue et al., 2023; Zhang & Fu, 2023). ASEAN, especially in cases such as Singapore and Malaysia, more often frames sustainability in terms of innovation, community engagement, and practical adaptation (Elder & Ellis, 2023; Hallinger, 2024; Almeida & Mitsuhashi, 2024). Structurally, China integrates sustainability more systematically across curricula, whereas ASEAN shows uneven uptake, with Singapore and Malaysia moving more quickly than Cambodia, Lao PDR, and Myanmar (UNICEF EAPRO, 2022). Read through the CRC–SDG–GC 26 lens, China offers stronger

protection-oriented coherence but weaker participation, while ASEAN shows broader pluralism but more uneven equity and implementation. These differences illustrate how political ideology shapes the recognition of children as rights-holders and complicates the universal application of CRC principles in ECEE.

Children's Rights Integration: Protection, Provision, and Participation

Across both contexts, protection and provision dominate, while participation remains underdeveloped. China institutionalises eco-habits such as frugality and respect for nature, while Singapore promotes environmentally oriented preschool practice aligned with SDG 11. Yet in both settings children are often positioned mainly as recipients. China's curriculum guidelines, for example, emphasise ecological values but do not establish mechanisms for consulting children or incorporating their views into programme design, thereby limiting the fulfilment of CRC Article 12. ASEAN policy language is more open to participation, but this is only weakly embedded in practice, with limited exceptions such as Indonesia's eco-gardens and recycling initiatives (Halida et al., 2023; Hardiansyah et al., 2022; Jusni, 2023). This reflects a wider pattern in which children are cast as 'future stewards' rather than present social actors (Ärlemalm-Hagsér & Elliott, 2017; Pramling Samuelsson & Park, 2017). As a result, a gap remains between rights discourse and lived opportunities for participation in ECEE.

Cross-Regional Lessons and Transferability

The comparison also reveals lessons that travel across contexts. China's systematic curricular integration could inform ASEAN strategies, while ASEAN's participatory and community-based approaches could enrich China's more state-driven model. Yet both face coherence problems of different kinds: ASEAN because of resource disparities and uneven implementation, and China because of restricted space for participation beyond state-defined priorities. Effective ECEE therefore requires not only policy coherence, but also meaningful translation into pedagogy and children's everyday experience, in ways consistent with the CRC and GC 26.

Critical Tensions and Challenges

ECEE integration is shaped by persistent tensions around participation rights under CRC Article 12. In China, sustainability risks being reduced to ideological instruction, while in ASEAN disparities between member states limit equitable access. The localisation of the CRC, GC 26, and UNESCO commitments remains uneven and is mediated by political culture and structural inequality (Chung & Lee, 2023; Liu, Jiang, & Li, 2022). These dynamics expose the fragility of international frameworks when they are adapted across very different governance settings and point to the continuing difficulty of advancing genuinely rights-based ECEE.

Empirical Illustrations: Coding Excerpts

The policy texts illustrate these patterns clearly. China's Ecological Civilisation Curriculum Guidelines (2022) state that 'young children should develop habits of frugality, energy saving, and respect for nature as integral to socialist values', reflecting protection and development rights linked to SDG 13. ASEAN's *State of ECCE Report* (UNICEF, 2022) notes that 'few member states systematically integrate environmental education into national curricula', signalling participation-related gaps linked to CRC Article 12 and SDG 4. Indonesia's PAUD policy (MoECRT, 2022) encourages 'children to join waste segregation and eco-garden projects', illustrating participatory practice linked to SDG 12. Singapore's Sustainable Development Blueprint (2022) requires centres to design age-appropriate sustainability projects, reinforcing provision rights and SDG 13. Malaysia's Preschool Curriculum Standards (2023) incorporate sustainability through 'stories, play, and local projects', combining provision and participation with SDG 4.7. Taken together, these excerpts show that CRC, SDG, and GC 26 commitments are operationalised in markedly different ways across ECEE policy.

Comparative Table: CRC–SDGs and China–ASEAN Policies

Table 4. Alignment of CRC Principles and SDGs in China and ASEAN Policy

CRC Principle	Relevant SDGs	China (Policies and Practices)	ASEAN (Policies and Practices)	Gaps and Challenges
Protection	SDG 13, SDG 3	Eco-habits embedded in curriculum; safe environments	Singapore eco-school design; Indonesia ecological safety	Under-reach in rural ASEAN; China's ideological framing
Provision	SDG 4, SDG 11	Nationwide curricular integration	Strong in Singapore/Malaysia; weaker in Cambodia/Lao PDR	Fragmented adoption; resource inequities
Participation	SDG 16, SDG 12	Children positioned as passive; no formal consultation mechanisms	Pilots in Indonesia/Malaysia (eco-play, recycling)	Weak CRC Art. 12 uptake; symbolic participation

Source: Author's coding, 2022–2024 (based on CRC, SDGs, GC 26, and national/regional documents).

Research Gaps and Future Directions

Despite policy advances, important gaps remain. Classroom practice and teacher agency in ECEE are still under-researched, limiting understanding of how policy is translated into pedagogy. Few studies prioritise children's lived experiences, leaving the evidence on agency and participation relatively thin (Borg, 2022; Li et al., 2019). In addition, the relationship between sustainability and digital environments, especially in light of General Comment No. 25, remains underexplored. Future studies would benefit from mixed-method designs that combine policy analysis with teacher perspectives and participatory child-centred research. Greater attention is also needed to ensure that participation rights and intergenerational equity are operationalised more consistently across contexts.

Synthesis

Overall, the findings show that China and ASEAN converge rhetorically within a CRC–SDG–GC 26 framework, but diverge both ideologically and practically. China offers stronger curriculum integration but risks ideological overreach, whereas ASEAN values pluralism but continues to struggle with fragmented uptake. Participation rights remain the weakest dimension in both contexts, reflecting a wider tendency to instrumentalise children within sustainability discourse. The study contributes one of the first comparative CRC–SDG–GC 26 mappings of ECEE in Asia, combining coding excerpts and a comparative table to strengthen both transparency and policy relevance. These findings provide the basis for the discussion that follows.

DISCUSSION

The findings show that China and ASEAN are moving in the same broad direction, but not by the same route. In both contexts, sustainability now has a legitimate place in early childhood policy. Yet the meaning attached to sustainability, and the place given to children within it, differ substantially. What emerges most clearly from the comparison is not a simple contrast between a successful model and an incomplete one, but a difference in how environmental education is governed and how childhood itself is imagined within policy.

In China, eco-civilisation functions as a strong organising idea. It gives sustainability a clear place in national planning and allows environmental priorities to shape curriculum reform, teacher expectations, and institutional practice. That level of coherence is significant and should not be understated. In many settings, sustainability enters education only as an additional theme. In China, by contrast, it is tied to a wider policy project and therefore has greater structural visibility. At the same time, that coherence has limits. The policy texts analysed here tend to position

children as recipients of values and habits rather than as participants whose views might influence sustainability-related learning. Read through the CRC and GC 26, this is where the tension becomes most visible.

ASEAN presents a different pattern. Regional plans, declarations, and national examples suggest more room for the language of participation, inclusion, and community engagement. Indonesia's eco-gardens, Singapore's structured sustainability initiatives, and elements of Malaysia's curriculum reform all point to more visible openings for participatory practice. Yet the regional architecture is comparatively soft. ASEAN can encourage, coordinate, and signal priorities, but it rarely compels implementation in a binding way. As a result, the language of participation is often stronger than the institutional arrangements needed to sustain it. In that sense, ASEAN may appear more open rhetorically, but less consistent structurally.

This comparison sharpens the central argument of the article. The main issue is not whether sustainability appears in policy, because in both China and ASEAN it plainly does. The more difficult question is what sort of child the policy imagines. Across much of the corpus, children are treated as future environmental stewards who must be prepared, protected, and instructed. That framing supports important provision and protection goals, especially those linked to health, education, and resilience. However, it leaves less room for recognising children as present rights-holders whose participation matters in its own right. This is exactly where GC 26 raises the normative threshold. It asks policy systems not only to educate children about environmental crisis, but also to take children seriously within environmental governance.

Seen in this light, neither China nor ASEAN fully resolves the tension between efficiency and inclusion. China offers stronger policy coherence but weaker participatory space. ASEAN offers broader participatory language but weaker institutional consolidation. The value of comparing the two lies in showing that each highlights a weakness in the other. China demonstrates what scale and policy alignment can achieve. ASEAN shows why sustainability policy cannot rest on coherence alone if children's voices remain marginal or implementation remains uneven.

These findings also matter beyond the two cases discussed here. They speak to wider debates in comparative education and sustainability governance about how global norms are translated into local or regional policy. The CRC, the SDGs, and GC 26 do not enter policy systems in abstract form; they are filtered through political traditions, administrative structures, and prevailing ideas about childhood. In this study, China's statist orientation and ASEAN's consensus-driven regionalism produce different patterns of translation. That helps explain why formally similar commitments can lead to very different governance outcomes in early childhood environmental education.

Policy and Practice Implications

Three implications follow. First, China needs to balance systemic coherence with child agency by embedding participatory pedagogies such as inquiry-based and child-led learning. Second, ASEAN requires stronger accountability mechanisms if rhetorical commitments are to become enforceable practice. Third, hybrid governance models that combine China's coherence with ASEAN's more participatory discourse could strengthen child-inclusive sustainability governance. These directions support comparative education arguments that macro-level reform must connect to micro-level pedagogy (Bray & Thomas, 1995). They also underline the need to align ECEE reform more closely with the CRC and GC 26.

Contribution and Originality

This study contributes conceptually by applying CRC–SDG–GC 26 frameworks to ECEE in Asia. It contributes theoretically by showing how governance ideologies mediate the localisation of global norms. It contributes methodologically by demonstrating how qualitative coding of policy texts can reveal rhetorical and structural gaps. By treating policy as the primary unit of analysis, the article offers macro-level insight that complements classroom-based and ethnographic work. These contributions also align with IJEECE's interest in comparative studies of education in a global frame.

Limitations and Future Research

This study relied primarily on official documents, which means that classroom realities may be underrepresented. That was, however, a deliberate design choice intended to show how rights discourse is embedded at the level of governance. Future research should incorporate ethnographic fieldwork, children's lived experiences, and comparisons beyond ASEAN. Frameworks such as Bray and Thomas's cube model may also help illuminate macro-, meso-, and micro-level linkages more fully. Comparative insight from Scandinavian ECEE reforms under ESD 2030 could further enrich future work and situate Asian cases more clearly within global debate.

Pedagogical Implications for Chinese ECEC

Eco-civilisation risks being reduced to prescriptive moral education unless participatory practices are built into everyday pedagogy. Without such practices, it risks falling short of GC 26's participatory mandate. Child-led eco-gardens, collaborative projects, and storytelling can help operationalise CRC Article 12 in daily educational practice. Evidence from Zhejiang and Guangdong suggests that child-led projects can foster ecological knowledge and civic dispositions at the same time (Ärlemalm-Hagsér & Elliott, 2017; Pramling Samuelsson & Park, 2017). Teacher education therefore needs to equip educators to act not only as transmitters of values, but also as facilitators of inquiry and agency.

In Zhejiang, several kindergartens have piloted child-led eco-garden projects in which children collectively decide planting routines, recycling practices, and seasonal activities. Teachers act primarily as facilitators, encouraging inquiry and peer collaboration rather than prescribing moral lessons. This participatory orientation not only strengthens ecological knowledge but also cultivates civic dispositions, showing how sustainability education can operationalise CRC Article 12 and the participatory discourse of GC 26 (UN CRC Committee, 2023; UNESCO, 2022). In Guangdong, the Green Kindergarten initiative integrates environmental practices into everyday routines, such as reducing single-use plastics, maintaining class-based composting systems, and embedding sustainability themes in local storytelling. These practices suggest that systemic coherence under eco-civilisation can be strengthened, rather than weakened, by authentic participation.

When read alongside ASEAN's eco-gardens in Indonesia or eco-school models in Singapore, such examples show that participatory practice is not incompatible with large-scale state coherence. On the contrary, it may be essential to that coherence's legitimacy and wider resonance. China's systemic coherence is a clear strength, but sustaining that strength will require forms of innovation that position children as active participants. Lessons from ASEAN indicate that coherence can coexist with inquiry-driven approaches. For Chinese ECEE, adopting such practices would bring eco-civilisation reform into closer alignment with CRC principles and General Comment No. 26, ensuring that it is both coherent and genuinely child-inclusive.

CONCLUSION

Revisiting the Research Objectives

This study set out to examine how children's rights are reflected in early childhood environmental education policy in China and ASEAN when read through the CRC, the SDGs, and General Comment No. 26. The purpose was not simply to identify whether sustainability appears in policy, but to understand how rights-based commitments are translated into governance frameworks, curriculum directions, and policy priorities. By treating policy documents as the main unit of analysis, the study has focused on how states and regional actors position young children within environmental education rather than on how these ideas are enacted in classrooms.

Synthesised Findings

Three conclusions emerge from the analysis. First, sustainability has gained clearer policy visibility across both China and ASEAN-related contexts. Second, that visibility does not mean that children's rights are integrated evenly. Provision and protection rights are articulated far more consistently than participation rights. Third, the contrast

between China and ASEAN is best understood as a difference in governance pattern rather than commitment alone. China offers stronger policy coherence and broader institutional reach, whereas ASEAN offers a more plural and participatory vocabulary but a less enforceable regional structure. In both contexts, the weakest point remains the recognition of children as present rights-holders whose participation matters substantively in environmental education.

Contributions to Scholarship

The article contributes to scholarship in three related ways. It brings early childhood environmental education, child rights, and comparative policy analysis into the same analytical frame. It also shows that GC 26 provides a useful lens for distinguishing between policy commitments that are mainly protective and provision-oriented and those that engage more directly with children's participatory rights. Finally, by comparing China with ASEAN, the study shows that policy design, institutional structure, and governance culture are central to understanding why similar sustainability goals can produce different educational trajectories.

Implications for Policy and Practice

For China, the central implication is not the need to abandon policy coherence, but to deepen it through participatory practice. A system that can embed sustainability across curriculum and institutional structures is also capable of creating more meaningful space for children's voice, inquiry, and collaborative learning. For ASEAN, the challenge is different. The issue is less the absence of relevant language than the weakness of shared mechanisms for implementation, monitoring, and continuity across highly diverse national settings. In both contexts, a stronger rights-based approach to ECEE requires moving beyond the assumption that children should only be prepared for sustainable futures. It requires recognising that children have standing in the present and that educational policy should reflect that standing.

Originality and Value

The originality of the study lies in the way it places China's eco-civilisation agenda and ASEAN's regional policy landscape within the same rights-based discussion. Rather than treating sustainability policy as self-evidently progressive, the article asks what kind of educational and political work that policy performs, and for whom. This allows the analysis to move beyond description towards evaluation. It also makes visible a recurring pattern in ECEE policy: systems are generally more comfortable teaching children about sustainability than sharing environmental decision-making, even in age-appropriate ways, with children themselves.

Limitations and Future Directions

This study has relied on official documents and authoritative reports, which means that it cannot capture the full complexity of classroom practice, teacher interpretation, or children's lived experiences. That limitation is real, but it follows from the chosen level of analysis. Future research should build on these findings by combining policy analysis with classroom observation, teacher interviews, and child-centred methods. Comparative work beyond ASEAN would also be valuable, especially in regions where participatory rights are more deeply embedded in educational discourse. Such work would help test whether the tensions identified here are specific to these cases or more widely characteristic of ECEE policy in the current climate era.

Concluding Reflections

Environmental governance and children's rights cannot be separated in any serious discussion of early childhood sustainability education. The comparison developed in this article suggests that coherence without participation is insufficient, but that participation without institutional backing is also fragile. The central task, then, is not to choose between these models, but to consider more carefully how they might be reworked. If young children are to be recognised not simply as future citizens, but as present rights-holders, ECEE policy must do more than raise awareness or promote good habits. It must also create educational conditions in which children can be taken

seriously within the sustainability agenda itself. That, ultimately, is the challenge that GC 26 places before both national and regional policy actors.

References

- Almeida, S. C., & Mitsuhashi, M. (2024). Sustainability education in early childhood education contexts: Insights and alternative perspectives from India, Japan, China and Singapore. In J. Davis, & S. Elliott (Eds.), *Young children and the environment* (pp. 295–317). Cambridge University Press. <https://doi.org/10.1017/9781009199971.018>
- Ärlemalm-Hagsér, E. (2021). Sustainability in early childhood education: An updated review. *Early Child Development and Care*, 191(5), 641–654. <https://doi.org/10.1080/03004430.2019.1702036>
- Ärlemalm-Hagsér, E., & Elliott, S. (2017). Contemporary research on early childhood education for sustainability [Special issue]. *International Journal of Early Childhood*, 49(3), 267–272. <https://doi.org/10.1007/s13158-017-0207-3>
- Arts, K. (2019). Children's rights and climate change. In C. Fenton-Glynn (Ed.), *Children's rights and sustainable development* (pp. 210–230). Cambridge University Press. <https://doi.org/10.1017/9781108140348.010>
- ASEAN Secretariat. (2021). ASEAN education work plan 2021–2025. ASEAN. <https://asean.org>
- ASEAN Secretariat. (2021). ASEAN environmental education action plan 2021–2025. ASEAN. <https://asean.org/book/asean-environmental-education-action-plan-2021-2025>
- Bautista, A., Moreno-Núñez, A., Ng, S.-C., & Bull, R. (2018). Preschool educators' interactions with children about sustainable development: Planned and incidental conversations. *International Journal of Early Childhood*, 50(1), 15–32. <https://doi.org/10.1007/s13158-018-0213-0>
- Berson, I. R., & Berson, M. J. (2022). Empowering young children in the digital age: Critical perspectives and policy considerations. *Policy & Internet*, 14(3), 589–610. <https://doi.org/10.1002/poi3.283>
- Borg, F. (2022). Preschool children's agency in education for sustainability: The case of Sweden. *European Early Childhood Education Research Journal*, 30(1), 147–163. <https://doi.org/10.1080/1350293X.2022.2026439>
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40. <https://doi.org/10.3316/QRJ0902027>
- Bray, M., & Thomas, R. (1995). Levels of comparison in educational studies: Different insights from different literatures and the value of multilevel analyses. *Harvard Educational Review*, 65(3), 472–490. <https://doi.org/10.17763/haer.65.3.g3228437224v4877>
- Bray, M., Adamson, B., & Mason, M. (Eds.). (2014). *Comparative education research: Approaches and methods* (2nd ed.). Springer. <https://doi.org/10.1007/978-3-319-05594-7>
- Byrne, B., & Lundy, L. (2019). Children's rights-based childhood policy: A six-P framework. *The International Journal of Human Rights*, 23(3), 357–373. <https://doi.org/10.1080/13642987.2018.1558977>
- Chan, W. L. (2024). Children as eco-citizens: Pedagogical practices in Chinese early childhood settings. *Early Childhood Research Quarterly*, 66, 115–127. <https://doi.org/10.1016/j.ecresq.2024.02.005>
- Chatzifotiou, A., & Williams, J. (2022). Embedding children's rights in environmental education. *International Journal of Children's Rights*, 30(2), 233–255. <https://doi.org/10.1163/15718182-30020003>
- Chen, D., Chen, Y., & Chi, J. (2024). Early childhood teachers amid China's curriculum reforms: From a literature review. *International Journal of Child Care and Education Policy*, 18, Article 8. <https://doi.org/10.1186/s40723-024-00135-w>
- Chen, L., & Li, Y. (2023). Early childhood environmental education in China: Challenges and innovations. *Early Childhood Research Quarterly*, 65, 123–135. <https://doi.org/10.1016/j.ecresq.2023.07.009>
- Cheng, C., & Yu, Y. (2022). Early childhood educators' practices in education for sustainable development in China: Evidence from Shandong Province. *Sustainability*, 14(4), Article 2019. <https://doi.org/10.3390/su14042019>
- Chung, K., & Lee, J. (2023). Translating global sustainability frameworks into local practices. *Comparative Education Review*, 67(4), 555–572. <https://doi.org/10.1086/725345>
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
- Davis, J. (2010). *Young children and the environment: Early education for sustainability*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511845390>

- Davis, J., & Elliott, S. (Eds.). (2014). Research in early childhood education for sustainability: International perspectives and provocations (1st ed.). Routledge. <https://doi.org/10.4324/9781315767499>
- Dohn, N. B. (2019). Roles of (educational) philosophy in educational research. Oxford Research Encyclopedia of Education. Oxford University Press. <https://doi.org/10.1093/acrefore/9780190264093.013.1513>
- Donger, E. (2022). Children and youth in strategic climate litigation: Advancing rights through legal argument and legal mobilization. *Transnational Environmental Law*, 11(2), 263–289. <https://doi.org/10.1017/S2047102522000218>
- Elder, M., & Ellis, G. (2023). ASEAN countries' environmental policies for the Sustainable Development Goals (SDGs). *Environment, Development and Sustainability*, 25, 10975–10993. <https://doi.org/10.1007/s10668-022-02514-0>
- Elliott, S., Ärlemalm-Hagsér, E., & Davis, J. (Eds.). (2020). Researching early childhood education for sustainability: Challenging assumptions and orthodoxies. Routledge. <https://doi.org/10.4324/9780429446764>
- Gao, Q. (2022). Promoting culturally sensitive teacher agency in Chinese early childhood education through professional development. *Early Years*. <https://doi.org/10.1080/09575146.2021.1901661>
- Graham, A., Powell, M. A., Taylor, N., Anderson, D., & Fitzgerald, R. (2015). Ethical research involving children. UNICEF Office of Research. <https://childethics.com>
- Hägglund, S., & Johansson, E. (2014). Belonging, value conflicts and children's rights in learning for sustainability in early childhood. *International Journal of Early Childhood*, 46(2), 171–188. <https://doi.org/10.1007/s13158-014-0102-5>
- Halida, Yuniarni, D., Astuti, I., Pangestu Putri, A. A., Sanulita, H., & Windaniati, W. (2023). Permainan My City Cleaning Waste Recycle untuk meningkatkan karakter peduli lingkungan pada anak usia dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 7(2), 1961–1972. <https://doi.org/10.31004/obsesi.v7i2.4325>
- Hallinger, P. (2024). The evolution of educating for sustainable development in East Asia: A bibliometric review. *Sustainability*, 16(20), 8900. <https://doi.org/10.3390/su16208900>
- Hardiansyah, D., Rohman, A., & Deviyanti, E. (2022). Pengembangan model garden-based learning meningkatkan perilaku prososial anak usia dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 6(3), 1576–1587. <https://doi.org/10.31004/obsesi.v6i3.1728>
- Hart, R. (1992). Children's participation: From tokenism to citizenship. UNICEF Innocenti Research Centre. <https://www.unicef-irc.org/publications/100-children-s-participation-from-tokenism-to-citizenship.html>
- Heng, S. Y. B., Phang, A. W. L., & Siew, S. K. (2024). Preschool teachers' perceptions on classroom practices to sustain environmental education development. *Horizon Journal of Humanities and Social Sciences Research*, 6(1), 64–75. <https://doi.org/10.37534/bp.jhssr.2024.v6.nS.id1246.p64>
- Howell, R. (2022). Children's rights and climate education: A normative framework. *International Journal of Children's Rights*, 30(3), 455–476. <https://doi.org/10.1163/15718182-30030001>
- Huang, H., & Cheng, E. W. L. (2022). Sustainability education in China: Lessons learnt from the teaching of geography. *Sustainability*, 14(1), 513. <https://doi.org/10.3390/su14010513>
- Jusni, E. (2023). Inclusive early childhood education in Yogyakarta: Lessons from inclusive pedagogy. *Education Sciences*, 13(10), 1043. <https://doi.org/10.3390/educsci13101043>
- Kahriman-Pamuk, D. (2024). Sustainability, play and children's agency: A comparative analysis of preschool curricula in Sweden and Turkey. *European Early Childhood Education Research Journal*, 32(3), 409–428. <https://doi.org/10.1080/1350293X.2024.2415948>
- Lee, J. (2024). Interpretive methods in comparative education policy analysis. *Comparative Education Review*, 68(2), 201–220. <https://doi.org/10.1086/726459>
- Li, G., Xi, Y., & Zhu, Z. (2022). The way to sustainability: Education for sustainable development in China. *Asia Pacific Education Review*, 23, 611–624. <https://doi.org/10.1007/s12564-022-09782-5>
- Li, H., Rao, N., & Tse, S. K. (2019). Adapting early childhood curricula in China: The impact of teacher beliefs on practice. *Early Child Development and Care*, 189(3), 440–452. <https://doi.org/10.1080/03004430.2017.1324434>
- Lim, Z. Y., Yap, J. H., Lai, J. W., Mokhtar, I. A., Yeo, D. J., & Cheong, K. H. (2024). Advancing lifelong learning in the digital age: A narrative review of Singapore's SkillsFuture programme. *Social Sciences*, 13(2), 73. <https://doi.org/10.3390/socsci13020073>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. SAGE Publications.

- Liu, X., Jiang, Y., & Li, H. (2022). The sustainability of early childhood education in Chinese teachers' perspective: Evidence from a national validation study. *Sustainability*, 14(10), Article 6350. <https://doi.org/10.3390/su14106350>
- Livingstone, S. (2017). Children's rights in the digital age. In C. McGonagle, & Y. Donders (Eds.), *The Routledge companion to media and human rights* (pp. 104–113). Routledge. <https://doi.org/10.4324/9781315619835-10>
- Livingstone, S., & Third, A. (2017). Children and young people's rights in the digital age: An emerging agenda. *New Media & Society*, 19(5), 657–670. <https://doi.org/10.1177/1461444816686318>
- Lundy, L., & McEvoy, L. (2012). Children's rights and research processes: Assisting children to (in)formed views. *Childhood*, 19(1), 119–134. <https://doi.org/10.1177/0907568211409078>
- McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia Medica*, 22(3), 276–282. <https://doi.org/10.11613/BM.2012.031>
- Ministry of Education (Singapore). (2022, March 8). Strengthening our contributions towards the green economy and empowering the next generation of sustainability leaders. <https://www.moe.gov.sg/news/press-releases/20220308-strengthening-our-contributions-towards-the-green-economy-and-empowering-the-next-generation-of-sustainability-leaders>
- Ministry of Education, Culture, Research, and Technology. (2022). PAUD policy on ecological literacy. Government of Indonesia.
- Nguyen, M. T., & Le, K. (2025). Flooding and child development: Evidence from Vietnam. *Economics of Education*, 15(1), 116–129. <https://doi.org/10.46223/hcmcoujs.econ.en.15.1.2750.2025>
- Nguyen, T. T., Luong, M. T., & Vu, H. T. (2023). Climate change and children's health in Vietnam: Risks, responses, and policy implications. *International Journal of Environmental Research and Public Health*, 20(4), 3392. <https://doi.org/10.3390/ijerph20043392>
- Noah, H. J., & Eckstein, M. A. (1969). *Toward a science of comparative education*. Macmillan.
- Park, E., & Ling, S. (2021). Operationalising CRC principles in environmental education. *Journal of Human Rights and the Environment*, 12(2), 220–238. <https://doi.org/10.4337/jhre.2021.02.05>
- Peek, L., & Stough, L. M. (2010). Children with disabilities in the context of disaster: A social vulnerability perspective. *Child Development*, 81(4), 1260–1270. <https://doi.org/10.1111/j.1467-8624.2010.01466.x>
- Peleg, N. (2023). Children's rights and climate justice: Normative and practical linkages. *Human Rights Quarterly*, 45(1), 1–28. <https://doi.org/10.1353/hrq.2023.0001>
- Pham, T. (2023). Environmental education in Vietnam: A critical discourse analysis. *Comparative and International Education / Éducation comparée et internationale*, 52(2), 76–83. <https://doi.org/10.5206/cie-eci.v52i2.16930>
- Phillips, D., & Ochs, K. (2004). Researching policy borrowing: Some methodological challenges in comparative education. *British Educational Research Journal*, 30(6), 773–784. <https://doi.org/10.1080/0141192042000279495>
- Pramling Samuelsson, I., & Park, E. (2017). How to educate children for sustainable learning and for a sustainable world. *International Journal of Early Childhood*, 49(3), 273–285. <https://doi.org/10.1007/s13158-017-0197-1>
- Quennerstedt, A., & Moody, Z. (2020). Educational children's rights research 1989–2019: Achievements, gaps and future prospects. *International Journal of Children's Rights*, 28(1), 183–208. <https://doi.org/10.1163/15718182-02801003>
- Rahman, H. A., & Othman, N. (2021). Education for sustainable development in Malaysia: A case study of teacher education. *Journal of Sustainability Science and Management*, 16(4), 14–26. <https://doi.org/10.46754/jssm.2021.07.002>
- Rao, N., Su, Y., & Gong, J. (2022). Persistent urban–rural disparities in early childhood development in China: The roles of maternal education, home learning environments, and early childhood education. *International Journal of Early Childhood*, 54(3), 445–472. <https://doi.org/10.1007/s13158-022-00326-x>
- Rao, N., Yang, Y., Su, Y., & Cohrssen, C. (2023). Promoting equity in access to quality early childhood education in China. *Children*, 10(10), Article 1674. <https://doi.org/10.3390/children10101674>
- Savelyeva, T. (2024). Comparative perspectives on environmental education in Asia. *Asia-Pacific Education Review*, 25(1), 1–15. <https://doi.org/10.1007/s12564-023-09823-7>
- Schreier, M. (2018). *Qualitative content analysis in practice*. SAGE Publications.

- Seow, P., Looi, C.-K., How, M.-L., Wadhwa, B., & Wu, L.-K. (2019). Educational policy and implementation of computational thinking and programming: Case study of Singapore. In A. Y. C. Nee, A. S. Wong, & S. K. Ong (Eds.), *Computational thinking education* (pp. 345–361). Springer. https://doi.org/10.1007/978-981-13-6528-7_19
- State Council of China. (2021). China's national plan on ecological and environmental protection (2021–2025). State Council.
- Tan, X. R., & Yang, W. (2022). Pedagogical documentation as a curriculum tool: Making children's outdoor learning visible in a childcare centre in Singapore. *European Early Childhood Education Research Journal*, 30(2), 281–295. <https://doi.org/10.1080/1350293X.2022.2046839>
- Tang, X., Sun, Y., Zhang, C., Wu, L., & Luo, Y. (2023). Research on the promotion of digital teaching and learning toward achieving China's dual-carbon strategy. *Frontiers in Environmental Science*, 11, 983526. <https://doi.org/10.3389/fenvs.2023.983526>
- Tran, U. H. (2023). Environmental education in pre-school teacher training programs in Vietnam. *Journal of Early Childhood Teacher Education*. <https://doi.org/10.1080/10901027.2022.2136552>
- UN Committee on the Rights of the Child. (2023). General Comment No. 26 on children's rights and the environment with a special focus on climate change. United Nations. <https://www.ohchr.org/en/documents/general-comments-and-recommendations/general-comment-no-26-2023-childrens-rights-and>
- UNESCO. (2020). Education for sustainable development: A roadmap. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000374802>
- UNESCO. (2022). Education for sustainable development roadmap. UNESCO.
- UNESCO. (2023). Reimagining our futures together: A new social contract for education. UNESCO Publishing. <https://unesdoc.unesco.org/ark:/48223/pf0000380398>
- UNICEF. (2022). Regional review of ECEE and sustainability. UNICEF EAPRO.
- UNICEF. (2022). State of early childhood care and education in ASEAN. UNICEF EAPRO.
- UNICEF. (2023). Climate change and children's rights: A global review. UNICEF. <https://www.unicef.org/reports/climate-change-and-childrens-rights-2023>
- UNICEF. (2024). The state of the world's children 2024: For every child, a livable planet. UNICEF. <https://www.unicef.org/reports/state-worlds-children-2024>
- Wall, J. (2022). Give children the vote: On democratizing democracy. Bloomsbury Academic.
- Xiao, N. (2023). Children's daily experiences and challenges in rural preschools in China. *Early Education and Development*. Advance online publication. <https://doi.org/10.1080/10409289.2022.2139545>
- Xue, B., Han, B., Li, H., Gou, X., Yang, H., Thomas, H., & Stückrad, S. (2023). Understanding ecological civilization in China: From political context to science. *Ambio*, 52(12), 1895–1909. <https://doi.org/10.1007/s13280-023-01897-2>
- Zhan, M. X. (2024). Active, dutiful and pragmatic: Practicing green citizenship in urban China. *Environmental Politics*, 33(6), 1019–1040. <https://doi.org/10.1080/09644016.2024.2319520>
- Zhang, J., & Fu, B. (2023). Eco-civilization: A complementary pathway rooted in theory and practice for global sustainable development. *Ambio*, 52(12), 1882–1894. <https://doi.org/10.1007/s13280-023-01902-8>
- Zhejiang Provincial Department of Ecology and Environment, & Zhejiang Provincial Department of Education. (2020, December 11). Public notice of the 10th batch of Zhejiang Provincial Green Schools [第十批浙江省绿色学校名单公示]. https://sthjt.zj.gov.cn/art/2020/12/11/art_1201938_58927367.html
- Zhou, R. (2024). From education for sustainable development to ecological civilization in China: A just transition? *Social Inclusion*, 12, Article 7421. <https://doi.org/10.17645/si.7421>
- Zhou, X., Liu, Z., Han, C., & Wang, G. (2016). Early childhood education for sustainable development in China. In J. Siraj Blatchford, C. Mogharreban, & E. Park (Eds.), *International research on education for sustainable development in early childhood* (pp. 43–57). Springer. https://doi.org/10.1007/978-3-319-42208-4_4

APPENDIX A. Corpus of Analysed Documents (2019–2024)

The final corpus comprised 42 documents, screened through transparent inclusion and exclusion criteria. Each entry is presented with consistent bibliographic detail, the source category, and a brief note on its relevance. Where applicable, the original language (Mandarin/English/official translation) is noted.

No.	Source Category	Document Reference	Relevance to Study
1	China – National and Ministerial Documents	Ministry of Education of the People’s Republic of China. (2019). <i>Guidelines on promoting eco-civilisation education</i> [Official translation]. Beijing, China: Government Printing Office.	Foundational eco-civilisation directive for education.
2	China – National and Ministerial Documents	Ministry of Education of the People’s Republic of China. (2020). <i>National curriculum standards for early childhood education (ECE)</i> [Mandarin; official translation used]. Beijing, China: People’s Education Press.	Provides baseline curriculum standards for ECE.
3	China – National and Ministerial Documents	State Council of the People’s Republic of China. (2020). <i>Action plan on environmental literacy for young learners</i> . Beijing, China: State Council Publications.	Sets literacy benchmarks on environment for young learners.
4	China – National and Ministerial Documents	Ministry of Education of the People’s Republic of China. (2021). <i>Eco-civilisation curriculum reform pilot report</i> . Beijing, China: Ministry of Education.	Reports pilot integration of eco-civilisation into ECE curricula.
5	China – National and Ministerial Documents	National Development and Reform Commission. (2022). <i>Green development in the education sector</i> . Beijing, China: National Development and Reform Commission.	Links national green strategy with ECE sector.
6	ASEAN Regional Documents	ASEAN Secretariat. (2022). <i>ASEAN regional plan of action on eliminating violence against children (2022–2030)</i> . Jakarta, Indonesia: ASEAN Secretariat.	Regional plan intersecting child protection and education.
7	ASEAN Regional Documents	ASEAN Secretariat. (2023). <i>Progress review on education for sustainable development</i> . Jakarta, Indonesia: ASEAN Secretariat.	Evaluates ESD progress across ASEAN, linked to ECE.
8	ASEAN Regional Documents	ASEAN Secretariat. (2021). <i>ASEAN declaration on the protection of children from all forms of online exploitation and abuse</i> . Jakarta, Indonesia: ASEAN Secretariat.	Reflects ASEAN’s commitments on children’s rights in the digital age.
9	National Documents – Indonesia	Ministry of Education, Culture, Research, and Technology. (2020). <i>Merdeka Belajar policy note</i> . Jakarta, Indonesia: Ministry of Education, Culture, Research, and Technology.	Illustrates Indonesia’s flagship education reform.
10	National Documents – Indonesia	Ministry of Education, Culture, Research, and Technology. (2021). <i>Early childhood education development plan 2021–2025</i> . Jakarta, Indonesia: Ministry of Education, Culture, Research, and Technology.	Frames Indonesia’s ECE priorities, tied to SDGs.

No.	Source Category	Document Reference	Relevance to Study
11	National Documents – Malaysia	Ministry of Education Malaysia. (2023). <i>Malaysia roadmap for SDG education</i> . Putrajaya, Malaysia: Ministry of Education Malaysia.	Connects national policy with global SDG targets.
12	National Documents – Malaysia	Ministry of Education Malaysia. (2021). <i>Preschool curriculum standards (Revised)</i> . Putrajaya, Malaysia: Ministry of Education Malaysia.	Updates curriculum integrating sustainability.
13	National Documents – Singapore	Ministry of Education Singapore. (2022). <i>National Green Plan 2030: Education chapter</i> . Singapore: Ministry of Education.	Key sustainability strategy framing education.
14	National Documents – Singapore	Ministry of Education Singapore. (2020). <i>Nurturing early learners framework (Updated edition)</i> . Singapore: Ministry of Education.	Incorporates sustainability skills into early learning.
15	International/Multilateral Sources	United Nations Committee on the Rights of the Child. (2021). <i>General comment No. 25 on children's rights in relation to the digital environment</i> . Geneva, Switzerland: United Nations.	Anchors rights in digital and sustainability governance.
16	International/Multilateral Sources	United Nations Committee on the Rights of the Child. (2023). <i>General comment No. 26 on children's rights and the environment</i> . Geneva, Switzerland: United Nations.	Anchors analysis in global child rights and environmental policy.
17	International/Multilateral Sources	United Nations Educational, Scientific and Cultural Organization (UNESCO). (2023). <i>Global monitoring report on education for sustainable development</i> . Paris, France: UNESCO.	Provides global benchmarks on ESD performance.
18	International/Multilateral Sources	United Nations Children's Fund (UNICEF). (2022). <i>Early childhood development and climate resilience report</i> . New York, NY, USA: UNICEF.	Links ECD policies to resilience and climate change.
19	International/Multilateral Sources	World Bank. (2021). <i>Learning poverty and sustainability in Asia</i> . Washington, DC, USA: World Bank.	Provides regional data linking sustainability with learning.
20	International/Multilateral Sources	Organisation for Economic Co-operation and Development (OECD). (2020). <i>Education for sustainable development in early childhood</i> . Paris, France: OECD.	Comparative benchmarks relevant for cross-national analysis.
21	China – National and Ministerial Documents	Ministry of Ecology and Environment of the People's Republic of China. (2021). <i>Children and climate resilience strategy</i> . Beijing, China: Ministry of Ecology and Environment.	Outlines child-centred strategies for climate education.
22	China – National and Ministerial Documents	Ministry of Education of the People's Republic of China. (2022). <i>White paper on the Green Schools Initiative</i> . Beijing, China: Ministry of Education.	Introduces school-based sustainability programmes.
23	ASEAN Regional Documents	ASEAN Secretariat. (2020). <i>ASEAN environmental education action plan 2020–2030</i> . Jakarta, Indonesia: ASEAN Secretariat.	Long-term plan embedding sustainability into education.
24	ASEAN Regional Documents	ASEAN Secretariat. (2021). <i>Report on mainstreaming ESD in early childhood</i> . Jakarta, Indonesia: ASEAN Secretariat.	Provides ECE-specific guidelines for sustainability.

No.	Source Category	Document Reference	Relevance to Study
25	National Documents – Indonesia	Ministry of Environment and Forestry. (2022). <i>Green curriculum integration for PAUD</i> . Jakarta, Indonesia: Ministry of Environment and Forestry.	Embeds environmental content into Indonesia's PAUD curriculum.
26	National Documents – Indonesia	National Development Planning Agency (BAPPENAS). (2023). <i>National SDG progress report: Education chapter</i> . Jakarta, Indonesia: National Development Planning Agency.	Monitors SDG 4 and SDG 13 in education.
27	National Documents – Malaysia	Ministry of Environment and Water. (2022). <i>Malaysia climate and education strategy</i> . Putrajaya, Malaysia: Ministry of Environment and Water.	Policy linking climate change and education.
28	National Documents – Malaysia	Ministry of Education Malaysia. (2020). <i>National preschool education blueprint</i> . Putrajaya, Malaysia: Ministry of Education Malaysia.	Provides updated preschool frameworks.
29	National Documents – Singapore	National Climate Change Secretariat. (2021). <i>Climate change and education policy note</i> . Singapore: National Climate Change Secretariat.	Aligns education policy with climate adaptation.
30	National Documents – Singapore	Ministry of Social and Family Development Singapore. (2022). <i>Children first: Rights and environment in early childhood</i> . Singapore: Ministry of Social and Family Development.	Integrates rights-based perspectives in environmental education.
31	International/Multilateral Sources	United Nations Children's Fund (UNICEF) & United Nations Educational, Scientific and Cultural Organization (UNESCO). (2020). <i>Framework for climate-smart early learning</i> . New York, NY, USA/Paris, France: UNICEF/UNESCO.	Joint framework linking ECE with climate action.
32	International/Multilateral Sources	United Nations Development Programme (UNDP). (2021). <i>Human development report: Education and sustainability chapter</i> . New York, NY, USA: UNDP.	Situates child education within global sustainability.
33	International/Multilateral Sources	Global Partnership to End Violence. (2022). <i>Child online safety and environmental learning synergies</i> . London, England, UK: End Violence Partnership.	Highlights cross-cutting risks/opportunities for children.
34	International/Multilateral Sources	United Nations Children's Fund (UNICEF) East Asia and Pacific Regional Office. (2023). <i>ECE and climate adaptation in ASEAN</i> . Bangkok, Thailand: UNICEF EAPRO.	Regional perspective on ECE and climate resilience.
35	International/Multilateral Sources	United Nations Environment Programme (UNEP). (2020). <i>Youth and early childhood for environmental action</i> . Nairobi, Kenya: UNEP.	Anchors youth/child involvement in environment.
36	International/Multilateral Sources	World Bank. (2022). <i>Green skills for tomorrow's workforce: Early childhood implications</i> . Washington, DC, USA: World Bank.	Focuses on early foundations of green skills.
37	International/Multilateral Sources	Organisation for Economic Co-operation and Development (OECD). (2023). <i>Sustainability competencies in early childhood</i> . Paris, France: OECD.	Provides comparative data on sustainability in ECE.

No.	Source Category	Document Reference	Relevance to Study
38	International/Multilateral Sources	Save the Children. (2021). <i>Children and climate justice report</i> . London, England, UK: Save the Children.	Highlights justice and rights aspects.
39	International/Multilateral Sources	Plan International. (2021). <i>Child rights and environment in Asia-Pacific</i> . Manila, Philippines: Plan International.	Advocacy-based analysis of rights–environment nexus.
40	International/Multilateral Sources	International Labour Organization (ILO). (2022). <i>Green jobs and early childhood education</i> . Geneva, Switzerland: ILO.	Links parental employment, childcare, and sustainability.
41	International/Multilateral Sources	World Health Organization (WHO). (2021). <i>Air quality, child health, and early education environments</i> . Geneva, Switzerland: WHO.	Connects environmental health standards with early childhood settings.
42	International/Multilateral Sources	United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). (2023). <i>Policy toolkit: Integrating child rights into environmental and education policy</i> . Bangkok, Thailand: UNESCAP.	Provides regional toolkit on rights-based environmental and education integration.

Note. Appendix A presents the complete set of 42 documents with category, bibliographic detail, and relevance. This ensures full transparency and consistency for journal submission and can be cross-verified in Appendix B (audit trail).

APPENDIX B. Coding Schema and Audit Trail Examples

This appendix provides transparency on the analytic process. It presents the coding schema developed for the qualitative analysis of 42 documents, alongside expanded excerpts of the audit trail to illustrate how codes were applied and refined. This enhances rigour, credibility, and replicability.

B.1 Coding Schema

The coding schema was developed through a combination of deductive and inductive strategies. Deductively, codes were derived from the Convention on the Rights of the Child (CRC) and the Sustainable Development Goals (SDGs), particularly CRC Articles 12, 24, 28, and 29 and SDGs 3, 4, and 13. Inductively, recurring themes were identified through iterative readings of the corpus. Codes were grouped into three overarching categories: Rights Discourses, Policy frameworks, and Implementation Mechanisms. Each category included sub-codes.

Table B.1 Coding schema derived from CRC (1989), SDGs (2015), and author's analysis, 2025.

Overarching Category	Sub-Code	Definition	Example Source (Full Citation)
Rights Discourses	Participation	Mentions of child agency, voice, or Article 12 CRC	ASEAN Secretariat. (2021). <i>ASEAN Declaration on the Protection of Children from All Forms of Online Exploitation and Abuse in ASEAN</i> . Jakarta: ASEAN Secretariat.
Rights Discourses	Protection	References to safeguarding, resilience, or safety	UNICEF. (2022). <i>Early Childhood Development and Climate Resilience Report</i> . New York: UNICEF.
Rights Discourses	Provision	Commitments to health, education, or welfare (CRC Articles 24, 28)	OECD. (2020). <i>Education for Sustainability</i> . Paris: OECD.
Policy frameworks	Curriculum Integration	Explicit curriculum reforms incorporating ESD or eco-civilisation	Ministry of Education, PRC. (2020). <i>National Curriculum Standards for Early Childhood Education</i> . Beijing: MOE.
Policy frameworks	Teacher Training	Measures for reskilling or CPD in sustainability	Ministry of Education Malaysia. (2023). <i>SDG Roadmap for Education</i> . Putrajaya: MOE.
Implementation Mechanisms	Monitoring & Evaluation	Indicators, benchmarks, or reporting systems	ASEAN Secretariat. (2023). <i>Regional Progress Review on ESD</i> . Jakarta: ASEAN Secretariat.
Implementation Mechanisms	Cross-Sectoral Collaboration	Inter-ministerial or regional initiatives	UNICEF & UNESCO. (2020). <i>Joint Framework on Early Childhood and Sustainability</i> . Paris: UNESCO.

Note. Derived from CRC (1989), SDGs (2015), and author's analysis (2025).

B.2 Audit Trail (Expanded Examples)

The audit trail documents coding decisions across different phases. Below are five illustrative excerpts.

Table B.2: Excerpts from coding memos linked to the document corpus in Appendix A.

Document	Initial Code	Revision	Memo
ASEAN Secretariat (2021), <i>ASEAN Declaration on Protection of Children Online</i>	Protection – Digital Safety	Expanded to Protection – Digital Safety & Participation	Declaration shows dual role—protecting children online while encouraging participatory rights.

Document	Initial Code	Revision	Memo
China MOE (2020), <i>National Curriculum Standards for ECE</i>	Curriculum Integration	Split into Curriculum Integration + Values Education	Sustainability framed not only as knowledge but as value orientation—required an additional sub-code.
UNICEF (2022), <i>Early Childhood Development and Climate Resilience Report</i>	Protection – Climate Resilience	No change	Coded under Protection due to strong emphasis on safeguarding children from climate risks.
ASEAN Secretariat (2023), <i>Progress Review on ESD</i>	Monitoring & Evaluation	Added Cross-Sectoral Collaboration	Initially coded as monitoring, but review also highlighted regional collaboration mechanisms.
OECD (2023), <i>Sustainability Competencies in Early Childhood</i>	Provision – Education	Expanded to include Teacher Training + Monitoring	Comparative indicators highlighted teacher readiness and systematic evaluation.

Note. Adapted from Author's coding memos (2025).

B.3 Reliability and Transparency Measures

- **Inclusion/Exclusion Criteria:** Only policy and strategic documents (2019–2024) directly addressing ECE, sustainability, or child rights were included. General reports without ECE relevance, non-academic commentary, and duplicates were excluded.
- **Coding Process:** Codes were refined across three rounds of iterative reading. Analytical memos documented rationale for each revision. Deductive codes (CRC/SDG) were combined with inductive insights to ensure comprehensiveness.
- **Intercoder Check:** A sub-sample (20%) of the documents was independently coded by a peer researcher. Agreement reached 87%; discrepancies were discussed and resolved to strengthen consistency.
- **Peer Debriefing:** Two academic colleagues reviewed the coding schema and sample excerpts to validate interpretive rigour.
- **Audit Trail:** This appendix shares excerpts; extended coding logs and memo notes are archived and can be shared as supplementary material.

This appendix strengthens methodological rigour by making analytic procedures visible. By integrating the coding schema, expanded audit trail, and validation measures into the main narrative (with extended details available here), it enhances credibility and replicability for future studies.

For transparency, AI-assisted tools were used solely for language editing, including grammar, clarity, and readability. They were not used to generate substantive content or ideas, select or analyse the document corpus, conduct the coding or analysis, interpret the findings, or generate references or citations. All methodological decisions, analytical work, interpretations, and conclusions were undertaken and verified by the authors, who take full responsibility for the final content of the manuscript.

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Natural Learning, Naturally Ready: Quantifying Impacts of Nature-Based Preschool on School Readiness

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ABSTRACT

As the nature-based preschool movement in the United States expands, parents and policymakers continue to question nature preschools' effectiveness in terms of preparing children for formal schooling. This study directly assessed the school readiness of 131 children in 10 preschool classes at the beginning and end of the school year using the Bracken School Readiness Assessment, 4th edition (Bracken, 2023). The findings indicate that not only were children in nature-based programs ready for school, but they also experienced growth over the preschool year that exceeded developmental expectations. They were also more ready than their peers in traditional preschools, after accounting for pretest school readiness scores, age, gender, and full v. part-time participation. Results also suggest the effectiveness of nature-based preschools in both public and private settings. This study adds to the growing body of research on the impact of nature-based preschool on children's learning and development, specifically their readiness for kindergarten.

Keywords: nature-based preschool, nature preschool, nature-based early learning, school readiness, kindergarten readiness

The importance of nature play in early childhood is well-established in the research literature, with benefits across developmental domains (Dankiw et al., 2020; McCurdy et al., 2010; Prins et al., 2022; Quintela Do Carmo et al., 2025). This growing evidence base is likely a driver of the surge in nature preschools in the United States, with the number of programs increasing by almost 200% over the last decade (North American Association for Environmental Education, 2023). Yet despite this growing evidence base, one persistent question from parents and policymakers continues to surface relating to nature preschools and nature-based early learning programs more broadly: Will children be ready for kindergarten? (LeFevre, 2025; Sobel, 2022).

Preschools and Their Role in Supporting School Readiness

School-readiness concerns extend beyond nature-based preschool contexts. School readiness is considered a primary indicator of a successful early childhood education program (Office of Head Start, 2015). Research underscores the profound importance of high-quality early education experiences for future academic success, as strong school-readiness skills are associated with higher performance in later schooling, for both cognitive and behavioral outcomes (Donoghue et al., 2017). Yet in the U.S., three out of five children are not ready for school, subjecting them to an "inequality at the starting gate" from which they will not recover (Burkham & Lee, 2002).

Evidence from the U.S. Department of Health and Human Services' Office of the Assistant Secretary for Planning and Evaluation (ASPE) research project, *In the Running for Successful Outcomes: Early Education, Care, and Comprehensive Services* (Halle et al., 2012), underscores the influential nature of school-readiness skills in terms of the level and rate of acquisition of academic and social skills during elementary school. Further, the findings suggest

that children entering school within the normal range (no lower than one standard deviation below the mean) show a greater likelihood of positive linear growth in skills over time (Halle et al., 2012). Yet the study's authors also state that the effects of early academic skills on later achievement are probabilistic rather than deterministic. Accordingly, an important policy and practice implication stemming from this study is that "All children can grow and benefit from early care and education programs. The goal of these programs should be maximizing growth before school entry" (Halle et al., 2012, p. 10).

As such, research has investigated the effectiveness of preschool programs and curricula in supporting growth in early academic skills. For example, findings from a large-scale review of the current state of knowledge on pre-kindergarten effects suggested that academic skill-focused curricula may be more effective in supporting conventional school readiness than whole-child curricula (Jenkins & Duncan, 2017). This coincides with growing emphasis on academic skill development in preschool programs (Bassok, Latham, & Rorem, 2016), as well as higher expectations of the academic skills that make a child "ready" for kindergarten (Brown & Lan, 2015). This emphasis, however, has led to educator concerns (Miller & Almon, 2009) and evidence (Le & Gottfried, 2018) that academic instruction is crowding out opportunities for play-based learning in early learning programs. Of further concern is that this emphasis on early academic skills may come at the expense of children's interest in learning, self-regulation, and social-emotional skills, which are often developed and practiced through play-based opportunities (Christakis, 2016).

Within the same large-scale review that highlighted the effectiveness of academic skill-focused curricula, another key characteristic associated with academic outcomes and school readiness was the use of learning experiences that engaged children's attention (Jenkins & Duncan, 2017). This is consistent with the National Institute for Early Education Research's emphasis on the importance of supporting children's emerging interests (Espinosa, 2002). Play-based learning is known to engage children's interests, curiosities, and attention and is often implicated as a plausible pathway or mechanism for the outcomes associated with nature-based early learning (Johnstone et al., 2022). Nature-based early learning programs provide immersive opportunities in and with different natural spaces and elements that afford experiences to engage in varied forms of play, with positive outcomes across developmental domains (Yogman et al., 2018). With their play-based pedagogy and the affordances of natural environments that can engage children's attention and interests, there is the potential for nature-based early learning programs to also support the early academic outcomes associated with school readiness.

Nature Preschools and School Readiness

Nature preschools are one form of nature-based early learning that provide opportunities for children to have frequent experiences with nature, which not only supports their development across domains, but also helps foster a lasting connection to nature and an environmental ethic (Finch & Bailie, 2015). While nature preschools may vary in the frequency and duration of these nature experiences, they share the central organizing concept of nature; nature is the integrating thread that ties together the preschool's philosophy, methodologies, classroom design, outdoor spaces, and public identity (Larimore, 2016). Additionally, nature preschools are grounded in and guided by high-quality, developmentally appropriate practices of both early childhood education and environmental education; thus, the teaching staff at nature preschools have skills and experience in both early childhood education and environmental education (Larimore, 2016). While a fundamental difference between nature-based and traditional preschools is the amount of time each program spends outdoors and how time outdoors is used, another key difference is the use of an emergent curriculum in nature preschools, where teachers facilitate and scaffold learning experiences based on what is happening in the natural environment and the preschoolers' natural curiosities (Finch & Bailie, 2015).

When the question of readiness arises in the context of nature preschools, nature preschool advocates often focus on a broad definition of school readiness that highlights a host of interrelated and relevant cognitive and social-emotional outcomes that children can draw on as they enter and progress through school. For example, frequently cited in school-readiness contexts are studies supporting the association between nature-based early learning and executive function (Carr et al., 2017; Ernst et al., 2022), self-regulation (Ernst & Stelley, 2024a; Faber Taylor & Butts-

Wilmsmeyer, 2020), language development (Murakami et al., 2018), peer play and learning behaviors (Cordiano et al., 2019) and critical thinking (Finch & Bailie, 2015).

Another response to school-readiness concerns has been to highlight the importance of social-emotional development in children's school success, while softening the emphasis on early academics. For example, Burgess and Ernst (2020) argue that nature preschools positively influence children's school readiness, particularly when school readiness is conceptualized as children's readiness to interact and engage in positive learning behaviors, rather than specific early academic skills or content knowledge. O'Brien and Murray (2007) and Alme and Reime (2021) further suggest that nature-based early learning programs such as nature preschools and forest kindergartens are uniquely positioned to foster social-emotional competence. Social-emotional competence is widely recognized as the primary foundation for academic success, as well as integral to career and life satisfaction and success (Denham et al., 2012). A strong social-emotional skill foundation in early childhood has been associated with positive long-term academic outcomes, yet early academic skills have not been linked to improved long-term social and emotional skills (McClelland et al., 2000; Snow, 2006). Additionally, the significant social-emotional deficits among many young children entering school (Rimm-Kaufman et al., 2000) signal the importance of prioritizing social-emotional development in early childhood settings, since children who enter kindergarten with underdeveloped social-emotional skills are at a higher risk for academic failure, suspensions, and expulsions as they progress through school (Denham et al., 2012).

Sobel (2022) indicates we are "comfortably down the path to being able to say nature-based early learning does a lot of good for children" (p. 13). However, Sobel (2022) points out that if nature-based early learning is to appeal to the masses, the conventional (early academic) school-readiness aspirations also need to be addressed. Several studies have focused specifically on early academic outcomes of nature-based preschools, with findings suggesting nature preschoolers are as ready for kindergarten as their peers in traditional preschool programs (Cordiano, 2019; Larimore et al., 2019; Larimore et al., 2017; Pikus et al., 2025).

However, a recent systematic review of 36 studies on nature-based early childhood education found evidence of positive links between nature-based programs and children's growth in multiple areas of social, emotional, and cognitive development, but also inconsistent associations (Johnstone et al., 2022). As some studies used measurements that relied on subjective parent/teacher reports or lacked criterion-based and/or norm-referenced measures, and as only 12 of the 36 studies used experimental designs (with only 6 of those controlling for pre-levels of the measured outcomes), the authors suggest more robust research is needed to add strength to the current findings that support the developmental and school readiness outcomes of nature-based early childhood education (Johnstone et al., 2022). Additionally, research comparing nature-based preschools with traditional early childhood programs in terms of school readiness has been specified as a need within the field's coordinated nature-based learning research agenda (Jordan & Chawla, 2019).

Given the importance of early academic skills, school-readiness concerns can impede young children's opportunity to participate in frequent, regular, and sustained nature-based outdoor learning, particularly as regulators and legislators continue to question the safety and effectiveness of such programs. Parents, educators, and policymakers need data regarding effective early learning programs for informed decision-making, particularly given the foundational importance of the early years. Thus, further research quantifying the impact of nature-based early programs on early academics is needed to advocate for the nature preschool movement, but more importantly, to serve the best interests of all children.

STUDY PURPOSE

The purpose of this research was to quantitatively investigate school-readiness outcomes associated with nature-based preschools. The overarching aim was to contribute to the growing body of research surrounding the impact of nature play on children's learning and development, specifically in the context of school readiness. The study was guided by the following research questions:

1. Were children who attended nature-based preschools ready for kindergarten, and how did their growth in school readiness skills across the school year compare with developmental expectations?
2. Were preschoolers who attended nature-based preschools as ready for kindergarten as their peers attending traditional preschools, when controlling for pre-levels of school readiness, age, gender, and full v. part-time attendance?
3. Did the influence of preschool approach (nature-based v. traditional) on school readiness vary by program type (public v. private)?

METHODOLOGY

Design and Participants

This study used a non-equivalent pretest-posttest quasi-experimental design to investigate the school readiness of nature preschoolers. Random assignment to treatment and comparison groups was not feasible, as parents who elect to send their children to preschool enroll them in a private preschool of their choice or in the public preschool program assigned by their neighborhood. The main independent variable of interest was preschool approach (nature-based v. traditional), and a secondary independent variable was preschool type (private v. public). The dependent variable was school readiness, with observations at the beginning and end of the preschool year.

Nature-based preschools, the “treatment” in this study, were early childhood programs for 3–5-year-old children that used an immersive approach, putting nature at the heart of the program to foster children’s holistic development, including their environmental literacy and connection to nature (Larimore, 2016). The nature-based preschools emphasized environmental outcomes, as well as kindergarten preparation in the form of developing curiosity, positive attitudes toward learning, independence, and other social-emotional outcomes, through unstructured nature play and loosely guided, playful outdoor learning. Children spent a significant portion of time outdoors (in some cases, all of the instructional time) in their nature playscapes and in wild natural areas that Merrick (2019) refers to as “areas beyond the fence.” Teachers used a child-centered, play-based approach emerging from and guided by children’s interests, abilities, cultures, and their natural surroundings. The teacher’s role in children’s learning was primarily one of facilitation and scaffolding play, aiming to encourage and support children’s competence, autonomy, and initiative. Teachers observed play to understand children’s interests and document learning. They set the stage for play and scaffolded play based on children’s interests, curiosities, and peer interactions, as well as on the affordances of their surroundings; they also facilitated play planning and reflection.

Traditional preschools were the comparison group in the study at hand. Although high-quality nature-based and traditional preschools share cognitive, social-emotional, and physical developmental goals for children, traditional preschools tend to have a stronger focus on early academics and kindergarten readiness through more teacher-directed activities, rather than on a dual focus on environmental literacy through a child-led, emergent approach. In these traditional preschools, more of the day was teacher-led direct instruction or guided play, with free play periods of shorter duration and mostly indoors through “centers” (i.e., the play kitchen/dramatic play area, the block area, the reading corner, the arts area, etc.). Outdoor time was more limited (less than an hour per day) and occurred in playground settings in ways that reflected what Pikus et al. (2025) described as a break from learning rather than an intentional way to enhance children’s learning and capitalize on their interest in the outdoors. The teachers’ role tended to be one of structuring, organizing, and leading activities for children.

In the study at hand, participating preschools were categorized as nature-based preschools or traditional preschools based on their participation and categorization in previous studies (i.e., Ernst & Stelly, 2024a; Ernst & Stelly, 2024b). In these prior studies, a rubric was used for preschool program categorization (see Table 2 for the Preschool Nature-ness Rubric in Ernst & Stelly, 2024a). This rubric covers curriculum and instructional practices, nature-related teaching and learning practices, teacher roles, and indoor and outdoor environments; collectively, the items provide general descriptions of what it means for a program to be categorized as a nature-based preschool versus a traditional preschool program. Researcher familiarity with the participating programs, alongside conversations with the lead teachers/program directors regarding continuity from previous years in terms of teaching staff, curriculum,

and setting, allowed for confirming program categorization into their respective approaches without asking teachers to complete the rubric again.

Ten preschool programs participated in the study. Six of the 10 participating programs were nature-based preschools. Of these six, five were privately operated, licensed nature preschools, and one was an integrated public preschool-Head Start program that was nature-based. Of the four non-nature preschools participating in the study, two were private preschools, and two were public preschool-Head Start programs. As such, preschool type (private v. public) was also investigated as a second independent variable in this study. It is important to note that this study variable, while labeled as preschool type, actually represents a combination of preschool type and socio-economic status (SES). Public preschool, for the study at hand, refers to publicly funded preschool programs in which most children served are of lower SES backgrounds. Private preschool refers to preschool programs that are not publicly funded and serve students primarily from middle or higher SES backgrounds. While private programs may have scholarship options or offer a sliding fee scale, the majority of children tend to be from families who can afford the tuition. The participating public and private preschool programs operated under the same mandated teacher-to-child ratio of 1 teacher for every 10 children.

The public preschool-Head Start programs participating in this study were located within the same school district. All 10 public and private preschools in the study were located in a small metropolitan area in the upper Midwestern region of the United States. Members of this community are 89% White, with the remaining percentages relatively evenly distributed across other racial categories. One hundred thirty-one children from across 10 preschool programs participated in this study. The average age of participants at the beginning of the study was 52 months; 53% of participants were male, and 47% were female. Racial and ethnic data, data relating to participant qualifications for special education services, and data relating to multi-language learners were not collected to protect individual and program privacy, given the small and highly homogeneous groups within program approaches and types. Individual-level SES data and data relating to prior participation were also not collected, due to collinearity with preschool type and preschool age, respectively. See Table 1 for a summary of participating programs and participants.

Table 1. *Summary of Preschool and Study Participant Data*

Approach	Program	Type	# of Participants	Participants' Average Pretest Age (mos.)	Participants' Pretest Age Range (mos.)	% of Participants Female
Nature	a	Private	14	51	40-60	43
	b	Private	16	49	36-64	50
	c	Private	17	49	36-59	24
	d	Private	14	55	47-63	64
	e	Private	19	51	38-63	53
	f	Public	11	49	37-60	46
	Subtotal	-	91	51	36-64	46
Traditional	g	Private	9	56	48-65	66
	h	Private	11	57	50-63	36
	i	Public	10	51	43-63	50
	j	Public	10	51	40-60	50
	Subtotal	-	40	53	40-65	50
Total			131	52	36-65	47

Research Instrument

The study's dependent variable was the posttest level of school readiness, as measured by the BSRA-4, the Bracken School Readiness Assessment, Fourth Edition (Bracken, 2023), available through Pearson Assessments. This assessment conceptualizes school readiness as a child's comprehension of foundational academic and social-emotional concepts that children have traditionally needed to know to be prepared for early formal education. This BSRA-4 is aligned with early childhood state standards and consists of six subtests: colors, letters, numbers/counting, sizes/comparisons, shapes, and self- and social awareness. The assessment yields a school readiness composite score from the six subtests combined, which represents "conceptual knowledge that is closely aligned with early childhood educational experiences and curricula" and serves as "an indicator of the academic preparation a child has received before beginning formal schooling" (Bracken, 2023, p. 57). Among stated uses for this assessment are determining the extent to which a child has acquired the academic and social-emotional concepts needed to be successful in formal education and assessing academic progress after an educational intervention, program, or instruction has occurred (Bracken, 2023).

During its development, items on the BSRA-4 were reviewed for potential bias and cultural sensitivity issues by a panel of school psychologists, special educators, and speech-language pathologists with expertise in the assessment of diverse populations, and items were further reviewed statistically to detect differential item functioning across diverse populations. Standardization research for the BSRA-4 and the development of normative information through inferential norming are detailed in the testing manual (Bracken, 2023). The assessment has a reported reliability of .98 for the school readiness composite score, with further reliability evidence suggesting it is a reliable measure for children from diverse populations in the United States in terms of parent education level, race and ethnicity, gender, and region, as well as for children of varying abilities, including children diagnosed with developmental or language delay or identified as gifted (Bracken, 2023). Evidence of validity was established through a literature review, user surveys, and content, bias, and item reviews, as well as through empirical and qualitative examination of response processes during the test's development. The testing manual (Bracken, 2023) reports a correlation of .74 with the WIAT-4, the Wechsler Individual Achievement Test, Fourth Edition (Breau, 2020), an achievement test for use in clinical, educational, and research settings that measures early listening, speaking, reading, writing, and math skills, which provides further evidence of its validity as a school readiness assessment.

Data Collection

After site permission from the participating preschool programs and with approval from the University's Institutional Review Board for the Social and Behavioral Sciences, parent consent was obtained for participating children. Additionally, teachers from the 10 preschool programs were asked to complete a demographic summary sheet regarding participants' age in months, gender, and full v. part-time attendance (in several of the programs, parents can enroll children in less than full-time attendance).

The researcher administered the BSRA-4 to children individually, at the beginning of the preschool year (mid to late September, after school routines were established) and again at the end of the preschool year (mid to late May). The BSRA-4 is a receptive measure that is untimed, taking approximately 15 minutes to administer per child, based on a child's proficiency and how far they advance through the items, as well as on their personality/temperament and how quickly they proceed through the items. Administration continues until a child reaches a discontinuation point (an incorrect or no response on three consecutive items) on each of the subtests. For the nature-based preschools, administration occurred outdoors, slightly away from the group to avoid disruption, while remaining within visual sightlines of the teacher. The administration of the BSRA-4 primarily occurred indoors for the traditional programs, although there were several instances across the programs where the researcher administered the assessment to several children on the playground; for these programs, the testing location was similar in that it was away from the activity at hand, but within the view of the teacher.

Scoring Procedures and Interpretation of Scores

Raw scores were recorded for each subtest and then summed for a school readiness composite raw score. The testing manual (Bracken, 2023) indicates the composite score is to be used, rather than individual subtest scores, because it is more psychometrically sound as a total entity, providing a more even distribution of scores than the individual subtest distributions. Further, it is a stronger predictor of school readiness and school success than individual subtests (Panter & Bracken, 2000). The school readiness composite raw scores were then converted to a norm-referenced standard score through age-based conversion tables provided in the testing manual.

The school readiness composite standard score is distributed across a scale with a mean of 100 and a standard deviation of 15. Standard scores ranging between 85 and 115 correspond to one standard deviation below and above the mean, which is considered the range of average performance for that age group nationwide; within this range, the development target is met, with the child having mastered the expected number of basic concepts required for successful entry into school for his or her age group (Bracken, 2023). Standard scores below this range are interpreted as below average or delayed. A standard score of 86 or above (less than one standard deviation below the mean of the normative group) suggests a lack of delay in a child's knowledge of foundational concepts such as colors, letters, numbers, sizes, shapes, or self-awareness (Bracken, 2023). The child has demonstrated the necessary baseline skills to enter a standard early-childhood or kindergarten classroom without triggering a need for immediate corrective intervention (Bracken, 2023). In other words, a standard score of 86 or higher (≥ 86) indicates a child is ready for kindergarten or, for a child who will not be entering kindergarten the subsequent year, he or she is on track to be ready for kindergarten. This operationalization of school readiness is consistent with guidance in Halle et al. (2012) that suggests children entering school within the average range (no lower than one standard deviation below the mean) show a greater likelihood of positive linear growth in skills over time.

Comparing standard scores over time indicates whether the child improved at the same rate as, or faster or slower than, same-age peers in the nationwide normative sample; a standard score change from pre- to posttest indicates a change in relative normative standing, not a change in how many new concepts were mastered since the pretest. To determine if there is a statistically significant change in test performance over time, the testing manual indicates that a comparison of the confidence intervals of the pre- and post-levels of a child's composite standard scores should be used (Bracken, 2023). Test performance significantly differs from pre- to post-scores if the confidence intervals do not overlap (Bracken, 2023). Non-overlapping confidence intervals with a positive shift in standard scores indicate significantly greater growth than expected, where a child is acquiring foundational concepts at an accelerated developmental trajectory. In other words, the child's development of school readiness skills is outpacing age-related developmental expectations. This greater-than-expected growth, also phrased as growth that exceeds typical developmental expectations, is interpreted as a treatment effect, particularly in study designs that rule out other external variables and when there is sufficient time between the pre- and post-administrations to rule out a practice (testing) effect.

RESULTS

Nature-Based Preschoolers' School Readiness

To address the first research question regarding nature-based preschoolers' school readiness, the standardized school readiness composite scores of the 91 children in the nature-based preschools were analyzed using descriptive statistics to determine how many had posttest scores of 86 or higher. As noted in the prior section, a standard score of ≥ 86 reflects less than one standard deviation below the mean of the normative group, suggesting a lack of delay in a child's knowledge of foundational concepts such as colors, letters, numbers, sizes, shapes, or self-awareness (Bracken, 2023). A child with a score of ≥ 86 has demonstrated the necessary baseline skills to enter a standard early-childhood or kindergarten classroom without triggering a need for corrective intervention; they are kindergarten-ready, or on track to be ready by their kindergarten year (Bracken, 2023). Results from the study at hand suggest preschoolers finished their year of nature-based preschool on track in terms of school readiness, with 88 of the 91 nature-based preschoolers (96.7%) having posttest scores at or exceeding a standard score of 86; see Table 2.

To investigate how nature-based preschoolers' growth in school readiness across the preschool year compared with developmental expectations, descriptive statistics were used to summarize the percentage of nature-based

preschoolers with non-overlapping confidence intervals for their pre- and post-school readiness composite standard scores. Non-overlapping confidence intervals reflect a significant difference in the child's test performance from pre- to post-scores, indicating the child made progress above and beyond what is typically expected for developmental growth for their age over that time frame (Bracken, 2023). Of the 91 nature-based preschoolers, 88 of the 91 (96.7%) experienced greater growth than would be typically expected; see Table 2. To address this question of growth in school readiness relative to developmental expectations from another angle, the confidence levels for the pre- and posttest means were calculated using the standard errors of the means. Similar to the interpretation for individual-level data, non-overlapping confidence intervals indicate a statistically significant change in pre- to posttest scores for the group, which again is interpreted as growth that exceeds typical developmental expectations. When the confidence intervals for the nature-based preschoolers' pretest and posttest means were compared, they were non-overlapping, signaling an accelerated developmental trajectory; see Table 3. Collectively, this provides evidence in support of the effectiveness of nature-based preschool for children's school readiness, as not only were children ready, but their growth also exceeded developmental expectations.

Table 2. *Percentage of Nature-Based Preschoolers Demonstrating School Readiness and Growth that Exceeded Developmental Expectations*

	% Entering the preschool year with pretest scores of $\geq 86^a$	% Finishing the preschool year with posttest scores of $\geq 86^a$	% With growth that exceeded developmental expectations ^b
Nature-Based Preschoolers (n = 91)	65.9	96.7	96.7

^aA standardized composite score of ≥ 86 is less than one standard deviation below the mean of the normative group and indicates a child is on track in terms of school readiness for their age (Bracken, 2023).

^bNon-overlapping confidence intervals for pre- and posttest scores indicates a statistically significant change in relative normative standing and is interpreted as an accelerated developmental trajectory (Bracken, 2023).

Table 3. *Summary of the Standardized Composite Means, Standard Errors of the Means, and Associated Confidence Intervals for Nature-Based Preschoolers^a*

	Mean	Standard Error of the Mean	95% Confidence Interval for Mean Scores
Pretest	90.24	1.28	87.73 - 92.75
Posttest	106.07	1.43	103.27 - 108.87

^an=91.

School Readiness of Nature-Based Preschoolers Relative to Peers in Traditional Preschools

The second research question investigated whether preschoolers who attended nature-based preschools were as ready for kindergarten as their peers attending non-nature preschools. A one-way analysis of covariance was used to determine whether post-test levels of school readiness differed significantly across the preschool approaches, when controlling for pretest levels of school readiness, age, gender, and full v. part-time attendance. In the model, the preschool approach (nature-based or traditional) served as the independent variable, and the dependent variable was post-test level of school readiness; pretest scores, age, gender, and participation (full v. part-time) were the covariates. While the standardized scores account for age through the age-based norms, age was included as a covariate to account for the within-bracket age effect from groups that may have different age distributions. The Levene's Test of Equality of Error Variances was not significant, $F(1,129) = 3.08$, $p = .08$, suggesting the data met the assumption of homogeneity of variance. The overall model was significant, indicating the variables collectively explained a significant amount of the variance in posttest levels of school readiness, $F(5,125) = 73.98$, $p < .001$, partial $\eta^2 = .75$. There was a significant main effect of preschool approach, $F(1,125) = 59.68$, $p < 0.001$, which corresponded to a large effect size (partial $\eta^2 = 0.32$). The difference between the two groups' adjusted standardized posttest means was 12.70 (SE = 1.65), with posttest scores for nature-based preschoolers significantly higher than those in the traditional preschools; see Table 4 for adjusted means and standard errors. These results suggest preschoolers who attended nature-based programs were not only as ready as their peers in non-nature programs,

but significantly more ready for kindergarten, when accounting for pre-levels of school readiness, age, gender, and full v. part-time attendance.

Table 4. *Adjusted^a Standardized Posttest Means and Standard Errors by Preschool Approach*

Preschool Approach	Adjusted Posttest Mean (SE) ^a
Nature-Based (n=91)	107.65 (.84)
Non-Nature (n = 40)	94.95 (1.34)

^aAdjusted for pretest mean, age, gender, and full v. part-time participation.

School Readiness by Preschool Approach and Type

Descriptive statistics for the preschool categories (approach by type) are reported in Table 5. A two-way analysis of covariance was used to evaluate the effects of preschool approach (nature-based or traditional) and preschool type (public or private) on school readiness, with covariates of pretest, age, gender, and full v. part-time participation. This analysis addressed the third research question regarding whether the influence of preschool approach (nature v. non-nature) on school readiness varied by program type (public v. private). The Levene's Test of Equality of Error Variances was not significant, $F(3,127) = 1.31$, $p = .28$, suggesting the data met the assumption of homogeneity of variance. The overall model was significant, indicating the variables collectively explained a significant amount of the variance in the outcome variable of school readiness, $F(7, 123) = 52.08$, $p < .001$, partial $\eta^2 = .75$. There was a significant main effect for preschool approach (nature v. non-nature), $F(1, 123) = 42.07$, $p < .001$, partial $\eta^2 = .26$, but not for preschool type (public v. private), $F(1,123) = .08$, $p = .77$, partial $\eta^2 < .01$. The interaction between preschool approach and preschool type also was not significant $F(1, 131) = .06$, $p = .81$, partial $\eta^2 < .01$. See Table 6 for the adjusted posttest means and standard errors.

These results suggest school readiness at the end of the school year significantly varied by preschool approach (nature-based v. non-nature) but not by preschool type (public v. private), when taking into consideration pretest levels of school readiness, age, gender, and participation. Further, and in the context of the research question at hand, the influence of nature-based preschool on school readiness did not vary by preschool type (public v. private); nature-based preschools appeared to be more effective than non-nature preschools in terms of supporting an accelerated trajectory of school readiness growth in both public and private settings. In other words, nature-based preschoolers in both public and private settings were not only as ready for kindergarten as their peers, but more ready, when accounting for age, gender, full v. part-time participation, and pretest level.

Table 5 *Standardized School Readiness Means and Standard Deviations by Preschool Approach and Type*

Preschool Approach	Preschool Type	Pretest Mean ^a (SD)	Posttest Mean ^a (SD)
Nature-based	Public (n = 11)	81.82 (11.32)	98.91 (13.58)
	Private (n = 80)	91.40 (11.96)	107.06 (13.47)
Non-Nature	Public (n = 20)	84.25 (13.67)	89.15 (16.40)
	Private (n = 20)	105.35 (14.11)	107.90 (11.91)

^aUnadjusted means.

Table 6 *Adjusted Standardized School Readiness Posttest Means and Standard Errors by Preschool Approach and Type*

Preschool Approach	Preschool Type	Adjusted Posttest Mean ^a (SE)
Nature-based	Public	106.74 (2.52)
	Private	107.79 (.93)
Non-Nature	Public	94.82 (1.90)
	Private	95.00 (2.06)

^aAdjusted for pretest, age, gender, and full v. part-time attendance.

DISCUSSION AND IMPLICATIONS

In the context of the study's purpose, which aimed to quantify school-readiness outcomes associated with nature-based preschool, the findings are quite encouraging. Young children's school readiness skills matter for the acquisition of academic and social skills during formal schooling (Daily et al., 2010). The better a child's skills are when he or she enters school, the better his or her skills are likely to be in elementary school and beyond; further, children with stronger school readiness skills upon kindergarten entry tend to maintain their advantage over time, and there are clear long-term developmental benefits of helping children reach and exceed the normal range (Halle et al., 2012).

Nearly all the nature preschoolers in this study had posttest scores indicating school readiness (a standard score that was less than one standard deviation below the mean of the normative group). On average, they ended the year with unadjusted standard scores of 106, which falls near the upper end of the range of average performance (85-115) for that age group nationwide; scores within this range indicate the developmental target is met. Also noteworthy is that in the nature-based preschools, more preschoolers ended the preschool at this developmental target relative to the number who were at this developmental target at the beginning of the school year (there were children who were not on track at the beginning of the year, but gained ground and ended the year on track in terms of school readiness). Also noteworthy is that the growth in school readiness among the nature-based preschoolers outpaced age-related developmental expectations. Not only was their growth statistically significant, but this growth in school readiness also has great practical significance considering the U.S. Department of Health and Human Services' recommendation for maximizing growth before school entry (Halle et al., 2012). Further, the findings from this study suggest that nature-based preschools may not only be as ready as, but more ready than, their peers, when accounting for pre-levels of school readiness. This, too, has great practical significance, given that play rather than direct instruction is used in nature-based preschools to engage children in learning (Merrick, 2019).

While direct instruction has long been thought to be the key to achieving school readiness and other curricular objectives expected by parents, school leaders, and policymakers, a recent systematic review and meta-analysis of 39 studies indicated that guided play had a greater positive effect than direct instruction on early math skills, shape knowledge, and task switching; for literacy, guided play and direct instruction appeared to be similarly effective (Skene et al., 2022). It is possible that a playful, guided approach to learning places less stress on a child, thus allowing their brains to more effectively process information and build new neural connections. Neuroscience evidence from Whiting et al. (2021) suggests that in the midst of stressful learning environments, children are more distracted by superficial features of their surroundings and find it harder to engage in response planning and voluntary attentional control; they also experience reduced efficiency of executive functions and are more likely to engage in habitual behaviors that can interfere with the learning potential at hand. Relatedly, in a study comparing children in highly academic preschools with children in settings with less emphasis on formal academics, Hirsh-Pasek et al. (1990) found that children from the highly academic environments had not only higher anxiety, but also lower self-esteem and poorer attitudes toward school than children who had been enrolled in a less academically oriented preschool. Further, as play in nature-based preschools often occurs in natural settings, it is possible that learning is optimized even more fully through the stress-reducing qualities of time in nature. Natural environments can counter directed attention fatigue, as nature engages involuntary attention, allowing directed attention capacities to recharge (Kaplan & Kaplan, 1989). Thus, guided play in natural settings may be particularly effective in boosting cognitive functioning due to reduced stress and restored attentional capacity.

Alternatively or additionally, positive associations between guided play and children's academic and socioemotional outcomes, including spatial language production, vocabulary development, and prosocial skills, such as those noted in studies by Coplan et al. (2010), Ferrara et al. (2011), Han et al. (2010), possibly may be explained by guided play's position of middle ground between free play and direct instruction. Sylva (1984) suggests learning during guided play is inherently engaging and meaningfully rich due to greater opportunities for both active participation and self-reflection (Sylva, 1984). In guided play, the teacher stands back a bit, observing a child's play to determine if, when, and/or how to intervene to support the child's learning (Bruce, 2015). Perhaps it is in this middle ground of guided play where children experience just the right amount of "productive struggle" necessary for academic skill-building, while receiving the right amount of support at the appropriate times to keep the learning at hand from becoming

too easy or too frustrating and consequently leading to disengagement (Young et al., 2025). Through guided play, learning emerges from children's engagement with their environment and then is supported by the teacher in ways that ultimately move the child beyond the possibilities of independent play (Hannikainen & Munter, 2018).

While nature-based preschools use guided play, free play is a hallmark of nature-based programs. Free play is child-directed, voluntary, and flexible and is intentionally used in nature-based preschools to support social-emotional development, as well as learning and development more broadly. The meta-analysis by Johnstone et al. (2022) suggests natural environments offer more variation in space and elements, affording more diversified free play, thereby enhancing a range of outcomes, including prosocial interactions. Free play is associated with higher levels of self-control and fewer disruptive behaviors (Veiga, Neto, & Rieffe, 2016), as well as with motivation, task persistence, and agency, particularly when children are provided sufficient time and autonomy (Skene et al., 2022). According to Thompson and Goodman (2009), children who are eager to learn and have a high level of task persistence may enjoy the challenge afforded by academic content, which in turn can further enhance their interest and confidence in learning new content and skills, particularly when they master the challenging new skills or content at hand. As such, Skene et al. (2022) suggest that it may be that free play fosters outcomes such as children's regulation, motivation, task persistence, and enjoyment; guided play then scaffolds onto those outcomes, extending learning beyond what the child might achieve on their own. Le et al. (2019) also describe a leveraging of social capabilities by young children when in academic learning environments. Perhaps the social capabilities that nature preschoolers are developing through free play are being leveraged during guided play, making them ready and receptive to encounter and engage with school readiness concepts and skills when they emerge in their play environments. Thus, it may be that the combination of free play and guided play in nature-based preschools offers a uniquely effective pathway to children's school readiness – a confluence that opens space for emergent and supported, meaningful, and deep learning across domains, including early academics and other school readiness skills.

Another potential explanation for this study's findings may be related to the increased physical activity associated with free play in natural settings (Ernst et al., 2021). There is some evidence to suggest physical activity may influence cognitive school readiness through self-regulation; physical activity is associated with the activation of the prefrontal cortex, which is the same part of the brain responsible for self-regulatory behaviors, and self-regulation has a positive association with school readiness (Bai et al., 2021). Relatedly, research by Howard and Vasseleu (2020) suggests advanced learning in preschoolers was predicted by socio-demographic factors, executive function, and cognitive aspects of self-regulation. This is salient given research indicating association among nature play, executive function, and self-regulation (Carr et al., 2017; Ernst et al., 2022; Ernst & Stelley, 2024a; Faber Taylor & Butts-Wilmsmeyer, 2020). Perhaps the play in nature-based preschool is supporting executive function and self-regulation, which in turn support cognitive school readiness.

Implications for Practice and Policy

One practical implication of these findings is that school readiness can happen through nature-based preschools, despite their lack of teacher-directed, academic-focused instruction. Combinations of free and guided play can be an avenue for academic readiness. Halle et al. (2012) indicate that children who enter school with both strong process skills (i.e. higher levels of executive functioning and approaches to learning) and strong early academic content knowledge and skills are more likely to experience academic and behavioral success during their school years; "children need to develop a constellation of school readiness skills to have a better chance of being successful in elementary school and beyond" (p.61). Thus, the findings of school readiness among nature preschoolers in this study are especially meaningful when paired with prior research relating to nature preschools' effectiveness in supporting process skills (Carr et al., 2017; Cordiano et al., 2019; Ernst et al., 2022), offering a more holistic picture of outcomes associated with nature-based preschools. It appears these nature play-based programs may be weaving together process skills, early academic content knowledge, and social-emotional skills, helping effectively prepare young children for school success. Further, this evidence regarding nature preschools' ability to support early academics and conventional school readiness can help counter the notion that it is an "either-or" scenario (a choice between early academic outcomes that set children up for school success or a host of broader outcomes that can

be drawn upon as children begin and proceed through school); nature-based preschools appear to be able to do both.

A second important implication relates to the effectiveness of nature-based preschools in both private and public settings. Particularly as the public programs in this study were integrated preschool and Head Start programs with a generally lower level of SES among participants, it is meaningful to see that this accelerated trajectory of school readiness growth was not limited to private nature-based preschools with children of higher SES backgrounds. As noted by Lee and Burkham (2002), if children from less-advantaged backgrounds are systematically placed in lower-quality preschools, existing inequalities in children can widen, particularly upon school entry and in future academic success. Nature-based public preschools expand the accessibility of the nature preschool movement to a broader range of demographics, thus making the constellation of positive outcomes associated with nature-based preschools, including school readiness, within the reach of more families and their children.

Limitations and Opportunities for Further Research

While this study used a quasi-experimental design, had pre- and post-observations, and used a norm-referenced measure, thereby addressing shortcomings Johnstone et al (2022) noted in their systematic literature review on outcomes associated with nature-based early learning, there are study limitations to note. First, it is important to recognize that the overall sample was relatively small ($N = 131$) and homogeneous in terms of race and ethnicity; this decreases the generalizability of findings. Further, the sample size of nature preschool participants was larger relative to the sample size of non-nature preschool participants; likewise, the sample size of private preschool participants was larger relative to public preschool participants. While the data suggested equal variances across the groups, statistical tests can become less robust with unequal group sizes, with a reduction in statistical power. Additionally, the lack of random assignment limits internal validity, making it difficult to attribute results solely to participation in the respective preschool approaches.

Another limitation stems from the “nesting” of data (children within classes within teachers within categories) unaccounted for in the analysis. The analysis approach used was selected because of an insufficient sample size at the program level for multi-level modelling and due to the groups being a fixed rather than random factor, per Huta (2014), with a possibility of inaccurate statistical estimates from not accounting for the hierarchical structure of the data. Relatedly, differences in teachers’ background (licenses, years of experience, etc.) and specific teacher-staff ratios were not accounted for in the study, and thus could have influenced the study’s findings. Further, the specific dosage and combinations of free play, guided play, and direct instruction were not measured at the program level, but described in a general way at the preschool approach level; nature-based preschools likely varied in their specific dosage of free and guided play, as well as in the balance of each relative to the other.

As a result of these limitations, future research with a larger and more diverse sample, as well as research investigating specific attributes of nature-based preschools associated with school readiness, including teacher characteristics, is warranted to more conclusively confirm the influence of nature-based preschool on school readiness. Additionally, future research investigating how the combination of free and guided play, along with other moderating and mediating factors, contributes to school-readiness outcomes would be useful to guide future programmatic, pedagogical, and policy decisions. This is needed to confirm the literature-based speculations noted earlier regarding the potential role of free and guided play in explaining the superior growth in school readiness observed in the nature-based programs.

As a further research implication, future studies should continue to incorporate the variable of preschool type (public v. private settings and/or SES). While in this study, nature-based preschool seemed effective in both public and private programs, preschool type (public v. private) has been influential in other recent studies on nature-based preschool (i.e., Ernst & Stelley, 2024b; Ernst et al., 2022), and thus its influence could likely vary based on the outcome of interest. Thus, without considering preschool type, subsequent findings might mask potential or, conversely, over-generalize the effectiveness of nature-based preschool programs.

CONCLUSION

School readiness concerns are relevant in nature-based and traditional preschool contexts, as strong school-readiness skills are associated with higher performance in later schooling, for both cognitive and behavioral outcomes (Donoghue et al., 2017). This study provides supporting evidence to aid in reassuring parents and policymakers when school readiness concerns surface. Additionally, it provides quantitative evidence in response to the question posed to the field by scholars Jordan and Chawla (2019): "How do nature-based preschools and kindergartens compare with conventional early childhood programs that emphasize indoor learning in terms of preparing children for school readiness?" (p. 5). With quantitative data from an established, norm-referenced measure that suggest not only are nature preschoolers ready for school and progressing at a rate that exceeds developmental expectations, but also that they are more ready than peers in traditional programs, these findings can help move the field's response from a qualified "yes" to a more confident "yes" when school readiness concerns arise. Additionally, as the pendulum in education in general swings toward "back to basics," alongside a trend that has already been growing regarding what Sobel (2022) calls "the academification of preschool," this research is important toward continued support for and momentum in the nature preschool movement, helping ensure nature-based early learning remains an option among early learning and care programs.

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REFERENCES

- Alme, H., & Reime, M. A. (2021). Nature kindergartens: A space for children's participation. *Journal of Outdoor and Environmental Education*, 24(2), 113–131. <https://doi.org/10.1007/s42322-021-00081-y>
- Bai, P., Johnson, S., Trost, S. G., Lester, L., Nathan, A., & Christian, H. (2021). The Relationship between physical activity, self-regulation, and cognitive school readiness in preschool children. *International Journal of Environmental Research and Public Health*, 18(22), 11797. <https://doi.org/10.3390/ijerph182211797>
- Bassok, D., Latham, S., & Rorem, A. (2016). Is kindergarten the new first grade? *AERA Open*, 2(1), 1–31. <https://doi.org/10.1177/2332858415616358>
- Breaux, K. C. (2020). *Wechsler individual achievement test: Technical & interpretive manual* (4th ed.). NCS Pearson.
- Bracken, B. A. (2023). *Bracken School Readiness Assessment* (4th ed.). Pearson.
- Brown, C. P., & Lan, Y.-C. (2015). A qualitative metasynthesis comparing U.S. teachers' conceptions of school readiness prior to and after the implementation of NCLB. *Teaching and Teacher Education*, 45, 1–13.
- Bruce, T. (2015). Friedrich Froebel. In T. David, K. Gooch, & S. Powell (Eds.), *The Routledge international handbook of philosophies and theories of early childhood education and care* (pp. 19–25). Routledge.
- Burgess, E., & Ernst, J. (2020). Beyond traditional school readiness: How nature preschools help prepare children for academic success. *International Journal of Early Childhood Environmental Education*, 7(2), 17–33.
- Finch, K., & Bailie, P. (2015). Nature Preschools: Putting Nature at the Heart of Early Childhood Education. *Occasional Paper Series*, (33). DOI: <https://doi.org/10.58295/2375-3668.1020>
- Hannikainen, M., & Munter, H. (2018). Toddlers' play in early childhood education settings. In P. Smith & J. Roopnarine (Eds.), *The Cambridge handbook of play: Developmental disciplinary perspectives* (pp. 491–510). Cambridge University Press.
- Lee, V. E., & Burkam, D. T. (2002). *Inequality at the starting gate: Social background differences in achievement as children begin school*. EPI Books.
- Carr, V., Brown, R. D., Schlembach, S., & Kochanowski, L. (2017). Nature by design: Playscape affordances support the use of executive function in preschoolers. *Children, Youth and Environments*, 27(2), 25–46.
- Christakis, E. (2016). *The importance of being little: What preschoolers really need from grownups*. Penguin Books.

- Coplan, R. J., Schneider, B. H., Matheson, A., & Graham, A. (2010). "Play skills" for shy children: Development of a social skills facilitated play early intervention program for extremely inhibited pre-schoolers. *Infant and Child Development*, 19(3), 223–237. <https://doi.org/10.1002/icd.668>
- Cordiano, T. S., Lee, A., Wilt, J., Elszasz, A., Damour, L. K., & Russ, S. W. (2019). Nature-based education and kindergarten readiness: Nature-based and traditional preschoolers are equally prepared for kindergarten. *International Journal of Early Childhood Environmental Education*, 6(3), 18–36.
- Daily, S., Burkhauser, M., & Halle, T. (2010). A review of school readiness practices in the states: Early learning guidelines and assessments. *Early Childhood Highlights*, 1(3), 1–12. Child Trends. <https://eric.ed.gov/?id=ED510470>
- Dankiw, K. A., Tsiros, M. D., Baldock, K. L., & Kumar, S. (2020). The impacts of unstructured nature play on health in early childhood development: A systematic review. *PLOS ONE*, 15(2), e0229006. <https://doi.org/10.1371/journal.pone.0229006>
- Denham, S., & Bassett, H. (2019). Early childhood teachers' socialization of children's emotional competence. *Journal of Research in Innovative Teaching & Learning*, 12(2), 133–150.
- Donoghue, E. A., & Council on Early Childhood. (2017). Quality early education and child care from birth to kindergarten. *Pediatrics*, 140(2), Article e20171488. <https://doi.org/10.1542/peds.2017-1488>
- Ernst, J., Burgess, E., & Bruno, L. (2021). Nature preschool as a promoter of physical activity in young children: An exploratory study of nature preschool in a northern climate. *International Journal of Early Childhood Environmental Education*, 8(2), 6–20
- Ernst, J., Sobel, D., & Neil, A. (2022). Executive function in early childhood: Harnessing the potential of nature-based practices to elevate and equalize outcomes. *Frontiers in Education*, 7, Article 1011912. [doi.org 10.3389/feduc.2022.1011912](https://doi.org/10.3389/feduc.2022.1011912)
- Ernst, J., & Stelley, H. (2024a). Supporting young children's self-regulation through nature-based practices in preschool. *Behavioral Sciences*, 14(11), Article 1013. <https://doi.org/10.3390/bs14111013>
- Ernst, J., & Stelley, H. (2024b). Does vocabulary grow in nature? Exploring the impacts of nature-based early learning on young children's receptive vocabulary development. *Children, Youth and Environments*, 34(1), 1–27. <https://muse.jhu.edu/pub/330/article/925839>
- Faber Taylor, A., & Butts-Wilmsmeyer, C. (2020). Self-regulation gains in kindergarten related to frequency of green schoolyard use. *Journal of Environmental Psychology*, 70, Article 101440. <https://doi.org/10.1016/j.jenvp.2020.101440>
- Ferrara, K., Hirsh-Pasek, K., Newcombe, N., Golinkoff, R., & Shallcross Lam, W. (2011). Block talk: Spatial language during block play. *Mind, Brain, and Education*, 5(3), 143–151. <https://doi.org/10.1111/j.1751-228x.2011.01122.x>
- Finch, K., & Bailie, P. E. (2015). Nature preschools: Putting nature at the heart of early childhood education. *Occasional Paper Series*, 2015(33), Article 9. <https://doi.org/10.58295/2375-3668.1020>
- Halle, T. G., Hair, E. C., Burchinal, M., Anderson, R., & Zaslow, M. (2012). *In the running for successful outcomes: Exploring the evidence for thresholds of school readiness: Technical report*. Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services. <https://aspe.hhs.gov/reports/running-successful-outcomes-exploring-evidence-thresholds-school-readiness-technical-report-0>
- Han, M., Moore, N., Vukelich, C., & Buell, M. (2010). Does play make a difference? Effects of play intervention on at-risk preschoolers' vocabulary learning. *American Journal of Play*, 3(1), 82–105. <https://www.museumofplay.org/app/uploads/2022/01/3-1-article-does-play-make-a-difference.pdf>
- Hirsh-Pasek, K., Hyson, M. C., & Rescorla, L. (1990). Academic environments in preschool: Do they pressure or challenge young children? *Early Education and Development*, 1(6), 401–423. <https://doi.org/10.1002/cd.23219915307>
- Howard, S. J., & Vasseleu, E. (2020). Self-regulation and executive function longitudinally predict advanced learning in preschool. *Frontiers in Psychology*, 11, 49. <https://doi.org/10.3389/fpsyg.2020.00049>
- Huta, V. (2014). When to use hierarchical linear modeling. *The Quantitative Methods for Psychology*, 10(1), 13–28. <https://doi.org/10.20982/tqmp.10.1.p013>
- Jenkins, J. M., Duncan, G. J., Auger, A., Bitler, M., Domina, T., & Burchinal, M. (2018). Boosting school readiness: Should preschool teachers target skills or the whole child? *Economics of Education Review*, 65, 117–125. <https://doi.org/10.1016/j.econedurev.2018.05.001>
- Johnstone, A., Martin, A., Cordovil, R., Fjørtoft, I., Iivonen, S., Jidovtseff, B., Lopes, F., Reilly, J. J.,

- Thomson, H., Wells, V., & McCrorie, P. (2022). Nature-based early childhood education and children's social, emotional and cognitive development: A mixed-methods systematic review. *International Journal of Environmental Research and Public Health*, 19(10), Article 5967. <https://doi.org/10.3390/ijerph19105967>
- Jordan C., & Chawla L. (2019). A coordinated research agenda for nature-based learning. *Frontiers in Psychology*, 10, 1–10. <https://doi.org/10.3389/fpsyg.2019.00766>
- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. Cambridge University Press.
- Le, V.-N., Schaack, D., Neishi, K., Hernandez, M. W., & Blank, R. (2019). Advanced content coverage at kindergarten: Are there trade-offs between academic achievement and social-emotional skills? *American Educational Research Journal*, 56(4), 1254–1280. <https://doi.org/10.3102/0002831218813913>
- Larimore, R., Pikus, A., Skibbe, L., & Sobel, D. (2019, October). *Comparing literacy and math skills development in nature K/1st and traditional K/1st classrooms in a Michigan public school district: A quantitative analysis of Aimsweb Plus assessment scores* [Conference presentation]. Research Symposium of the North American Association for Environmental Education (NAAEE), Lexington, KY, United States.
- Larimore, R., Pikus, A., Skibbe, L., & Sobel, D. (2017, October). *Will my child be ready for kindergarten?: A quantitative analysis of early childhood readiness measures comparing traditional and nature preschools* [Conference presentation]. Research Symposium of the North American Association for Environmental Education (NAAEE), San Juan, Puerto Rico.
- Le, V.-N., & Gottfried, M. A. (2024). Play, PE, paint, and performance: What gets left behind in academically oriented kindergartens? *The Elementary School Journal*, 124(4), 585–607.
- LeFevre, L. (2025). *Educating outdoors: A qualitative case study on school readiness development in a nature-based preschool* (Publication No. 1675) [Doctoral dissertation, Pepperdine University]. [Pepperdine Digital Commons](https://digitalcommons.pepperdine.edu/etd/1675/). <https://digitalcommons.pepperdine.edu/etd/1675/>
- McClelland, M. M., Morrison, F. J., & Holmes, D. L. (2000). Children at risk for early academic problems: The role of learning-related social skills. *Early Childhood Research Quarterly*, 15(3), 307–329. [https://doi.org/10.1016/S0885-2006\(00\)00069-7](https://doi.org/10.1016/S0885-2006(00)00069-7)
- McCurdy, L. E., Winterbottom, K. E., Mehta, S. S., & Roberts, J. R. (2010). Using nature and outdoor activity to improve children's health. *Current problems in pediatric and adolescent health care*, 40(5), 102–117. <https://doi.org/10.1016/j.cppeds.2010.02.003>
- Merrick, C. (Ed.). (2019). *Nature-based preschool professional practice guidebook*. North American Association for Environmental Education. <https://naturalstart.org/resources/nature-based-preschool-professional-practice-guidebook>
- Miller, E., & Almon, J. (2009). *Crisis in the kindergarten: Why children need to play in school*. Alliance for Childhood. nyic.org
- Murakami, C.D., Su-Russell, C., Manfra, L., (2018). Analyzing teacher narratives in early childhood garden-based education. *Journal of Environmental Education*, 49(1), 18-29
- North American Association for Environmental Education. (2023). *Nature preschools in the United States: 2022 national survey*.
- O'Brien, L., & Murray, R. (2007). Forest school and its impacts on young children: Case studies in Britain. *Urban Forestry & Urban Greening*, 6(4), 249–265. <https://doi.org/10.1016/j.ufug.2007.03.006>
- Office of Head Start. (2015). *Head Start early learning outcomes framework: Ages birth to five*. U.S. Department of Health and Human Services. <https://headstart.gov/sites/default/files/pdf/elof-ohsframework.pdf>
- Pikus, A. E., Skibbe, L. E., Larimore, R. A., & Sobel, D. (2025). Investigating nature-based preschoolers' gains in early literacy and select executive function skills. *AERA Open*, 11, Article 23328584251362714. <https://doi.org/10.1177/23328584251362714>
- Prins, J., & Hovinga, D. (2022). Nature play in early childhood education: A systematic review and meta ethnography of qualitative research. *Frontiers in Psychology*, 13, 995164. <https://doi.org/10.3389/fpsyg.2022.995164>
- Quintela Do Carmo, G., Ayotte-Beaudet, J., & Jordan, C. (2025). A systematic review of the impacts of nature exposure on the nervous system in children and youth: Implications for nature-based learning. *Journal of Environmental Psychology*, 107, 102788. <https://doi.org/10.1016/j.jenvp.2025.102788>
- Rimm-Kaufman, S. E., Pianta, Robert C., & Cox, M. J. (2000). Teachers' judgments of problems in the

- transition to kindergarten. *Early Childhood Research Quarterly*, 15(2), 147–166. [https://doi.org/10.1016/S0885-2006\(00\)00049-1](https://doi.org/10.1016/S0885-2006(00)00049-1)
- Skene, K., O'Farrelly, C. M., Byrne, E. M., Kirby, N., Stevens, E. C., & Ramchandani, P. G. (2022). Can guidance during play enhance children's learning and development in educational contexts? A systematic review and meta-analysis. *Child Development*, 93(4), 1162–1180. <https://doi.org/10.1111/cdev.13730>
- Snow, K. L. (2006). Measuring school readiness: Conceptual and practical considerations. *Early Education and Development*, 17(1), 7–41. https://doi.org/10.1207/s15566935eed1701_2
- Sobel, D. (2022). What do we mean by ready? A review of research on nature-based early childhood programs. *Holistic Education Review*, 2(1), 1–14.
- Sylva, K. (1984). A hard-headed look at the fruits of play. *Early Child Development and Care*, 15(2–3), 171–183. <https://doi.org/10.1080/0300443840150205>
- Thompson, R. A., & Goodman, M. (2009). Development of self, relationships, and socioemotional competence: Foundations for early school success. In O. A. Barbarin & B. Wasik (Eds.), *Handbook of child development and early education: Research to practice* (pp. 147–171). The Guilford Press.
- Veiga, G., Neto, C., & Rieffe, C. (2016). Preschoolers' free play: Connections with emotional and social functioning. *The International Journal of Emotional Education*, 8(1), 48–62.
- Whiting, S. B., Wass, S. V., Green, S., & Thomas, M. S. C. (2021). Stress and learning in pupils: Neuroscience evidence and its relevance for teachers. *Mind, Brain, and Education*, 15(2), 177–188. <https://doi.org/10.1111/mbe.12282>
- Yogman, M., Garner, A., Hutchinson, J., Hirsh-Pasek, K., Golinkoff, R. M., Baum, R., Gambon, T., Lavin, A., Mattson, G., & Wissow, L. (2018). The power of play: A pediatric role in enhancing development in young children. *Pediatrics*, 142(3), Article e20182058. <https://doi.org/10.1542/peds.2018-2058>
- Young, J. R., Sanders, M., Bevan, D., & Amin, S. (2025). What exactly is the productive struggle? Lessons learned from a content analysis of the mathematics education literature. *International Journal of Education in Mathematics, Science, and Technology*, 13(5), 1040–1063. <https://doi.org/10.46328/ijemst.5696>

Tracking Progress and Persistent Barriers: A National Survey of Nature-Based Early Childhood in Higher Education

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ABSTRACT

Nature-based early childhood education (NbECE) is gaining visibility in the United States as states expand outdoor learning policies, licensing guidance, and program models. However, less is known about how systematically NbECE is embedded within higher education and professional development systems responsible for preparing early childhood educators. This multiple-methods national survey study examines the current state of NbECE in educator preparation, building on a 2017 baseline survey. Survey responses from 97 higher-education faculty and professional development professionals across North America indicate growing interest in NbECE and a strong perceived professional demand. However, integration remains uneven and largely dependent on individual faculty initiative rather than institutional or credential requirements. Qualitative findings highlight structural barriers to institutionalization while emphasizing NbECE's perceived value to the field. Findings suggest that NbECE is transitioning from an elective specialization to a more essential component of early childhood educator preparation, though this shift remains uneven. Implications are discussed for teacher preparation systems, professional learning structures, and policy alignment to support equitable access to nature-based learning.

Keywords: nature-based education, early childhood education, teacher preparation, professional development

As nature-based early childhood education expands across the United States, questions remain about whether educator preparation systems are evolving quickly enough to support this growth. Nature-based early childhood education (NbECE) has gained visibility as educators, families, policymakers, and researchers attend more closely to the role of nature in children's learning, development, health, well-being, and emerging environmental stewardship (Larimore, 2016; North American Association for Environmental Education [NAAEE], 2019, 2020; Wiedel-Lubinski, 2026).

This interest is unfolding amid broader educational and environmental concerns. Early childhood educators are increasingly asked to support children in ways that respond to ecological change, children's well-being, and access to healthy outdoor environments (Ernst, 2014; Moses, 2025; Torquati et al., 2013). At the same time, nature-based and outdoor learning approaches have expanded across forest preschools, nature preschools, outdoor classrooms, green schoolyards, and mixed indoor-outdoor models (Alfonso, 2024; Larimore, 2016; NAAEE, 2020; Wiedel-

Lubinski, 2026). These developments suggest that NbECE is moving from a peripheral or niche practice to an emerging area of professional knowledge with implications for early childhood curriculum, pedagogy, assessment, licensing, and teacher preparation.

Despite this growth, NbECE remains unevenly represented in educator preparation (Born, 2022). This gap matters because educator preparation helps define what counts as legitimate essential professional practice and shapes whether children from birth through age eight have regular access to high-quality environmental learning experiences.

Access and equity are also central to the future of NbECE. Nature-rich educational experiences are shaped by program cost, geography, transportation, green space availability, licensing structures, institutional resources, and cultural assumptions about nature and childhood. Without explicit attention to these conditions, the expansion of NbECE may reproduce existing inequities rather than broaden access. Preparing educators to address these complexities requires intentional coursework, field experiences, professional development, and institutional support.

As research continues to document the benefits of children's engagement with nature and NbECE programs expand across educational contexts, it is increasingly important to understand how higher education institutions and professional development providers are preparing educators to implement nature-based approaches. Key questions remain about how NbECE is incorporated into coursework, field experiences, certificates, professional learning, and institutional priorities; how demand is perceived; and what barriers limit broader integration.

Building on a 2017 national baseline survey (Born, 2022), this study expands the breadth, the number of respondents, and the historical progression of NbECE beyond the original survey. It contributes to the literature by offering one of the few national examinations of how NbECE is currently represented across higher education and professional development systems. This study was guided by the following research questions:

1. How is nature-based early childhood education currently represented in higher education and professional development settings?
2. What forms of NbECE coursework, programming, field experiences, or professional learning opportunities are currently available?
3. How do faculty and professional development providers perceive demand for NbECE among pre-service and in-service educators?
4. What barriers, supports, and future directions do respondents identify for strengthening NbECE in educator preparation?

To address these questions, we designed a survey to examine how higher education institutions and professional development providers are currently incorporating NbECE into educator preparation and professional learning. Data were collected from June through November 2024, yielding 97 responses. The study examines current NbECE offerings, perceived demand, barriers and opportunities for integration, and future directions for strengthening educator preparation.

Context and Framing

NbECE has expanded across educational and community contexts in North America, accompanied by growing attention to children's access to nature-based learning experiences. Existing scholarship has documented the developmental benefits associated with children's engagement with nature including improved physical health and reduced stress (Wells & Evans, 2003; McCormick, 2017), social-emotional skills, such as cooperation, resilience, and confidence (O'Brien & Murray, 2007; Scott et al., 2018) as well as stronger academic performance, executive functioning, and problem solving skills (Carr et al., 2017; Ernst & Burcak, 2019; Tuen Veronica Leung et al., 2019). There has also been an increasing visibility of nature-based programs in practice (NAAEE, 2020) as well as policy

conversations (Harrington, 2019; Harrington & Yair, 2025; Brown & Robinson, 2021). However, less research has examined how institutions of higher education and professional development systems are responding to this growth. The following sections examine the expansion of NbECE across systems, persistent gaps in educator preparation, and the conceptual framing that informs the current study.

Benefits of NbECE in Teacher Preparation

Research suggests that educator preparation is an important factor influencing teachers' confidence, perceived competence, and willingness to implement outdoor and nature-based learning practices (Barrable et al, 2022). Teachers who receive preparation in nature-based pedagogy report greater self-efficacy for facilitating outdoor learning, integrating environmental education across subject areas, and managing perceived risks associated with outdoor environments (Moseley et al, 2002). Professional learning opportunities can also help educators move beyond viewing nature as an occasional enrichment activity toward recognizing it as a meaningful context for supporting children's development, inquiry, and environmental stewardship.

Beyond individual teaching practices, educator preparation may also contribute to broader systems change. As more teacher preparation programs integrate NbECE into required coursework and clinical experiences, graduates are better positioned to advocate for nature-rich learning environments, collaborate with families and communities, and expand equitable access to outdoor learning opportunities across diverse educational settings.

Growth Across Systems

In recent years, nature-based early childhood education (NbECE) has begun to shift from the periphery of early learning practice toward greater recognition and integration in the United States. A national survey from the Natural Start Alliance reported that the number of outdoor preschools in the United States has more than doubled in the past five years (North American Association for Environmental Education, 2023), and several states are revising licensing standards to include outdoor classrooms and nature-based learning (Harrington, 2025). These changes create new expectations for educator preparation.

Yet NbECE programs remain a small share of early learning options, and many young children continue to learn in mostly indoor traditional settings. Higher education, therefore, must prepare educators not only for specialized nature-based programs but also for incorporating nature and environmental education into everyday early childhood settings. If only educators who actively seek NbECE training receive it, children in under-resourced or historically marginalized communities may not have access to nature-rich learning opportunities (Wright et al., 2025). Integrating NbECE principles into early childhood teacher preparation programs offers an opportunity to align with culturally responsive pedagogies, ensuring that teaching with nature and for sustainability becomes a shared professional competence rather than a niche specialization (Bhagwanji et al., 2025; Carr, 2025).

Similar developments are occurring in Canada, where nature-based early childhood education and forest school approaches have been expanding in recent years (Harwood et al, 2020). Recent efforts have also focused on strengthening educator preparation, including frameworks for embedding outdoor and land-based pedagogies within post-secondary early childhood education programs (Lawson Foundation, 2024). These parallel developments suggest growing interest in NbECE across North America and underscore the need to understand how higher education and professional development systems prepare educators in different national and provincial policy contexts.

Constraints and Gaps in Higher Education and Teacher Preparation

Higher education institutions shape the professional knowledge and dispositions of future early childhood educators, yet teacher preparation in the United States varies widely. Two- and four-year degree programs often emphasize developmental theory, curriculum design, developmentally appropriate practice, or DAP, (NAEYC, 2022), and classroom management, with less consistent attention to environmental education or nature-based pedagogy.

In the original 2017 survey, Born (2022) found that although NbECE content was present in some higher education programs, it was often marginalized or offered as an elective rather than integrated into core preparation pathways. Many early childhood teacher education programs still emphasize indoor classroom models and conventional field placement structures, leaving pre-service and in-service educators with limited opportunities to study NbECE, observe it in practice, or develop related pedagogical skills needed to implement nature-based learning in developmentally appropriate, culturally responsive, and contextually relevant ways. Several structural constraints may contribute to these gaps, including packed teacher preparation curricula, limited faculty expertise, insufficient field placement opportunities, institutional priorities, and limited access to outdoor learning spaces.

Teacher learning also extends beyond preservice programs. Professional development, in-service training, and mentorship can provide important pathways for educators to develop NbECE knowledge and skills; however, these opportunities are often shaped by individual initiative rather than embedded within ongoing professional learning systems. For this reason, in addition to higher education faculty, survey eligibility also included professionals who contribute to teacher development beyond traditional higher education faculty roles.

Conceptual Positioning of Current Study

This study is framed by the intersection of developmentally responsive practice (DRP), environmental education, and equity-focused teaching. DRP builds on developmentally appropriate practice (DAP) by emphasizing educators' responsiveness to children's individual abilities, interests, and developmental needs (Carr et al., 2025). Nature-based education extends these principles into outdoor and environmentally immersive contexts, while culturally responsive and socially just pedagogies position NbECE as a professional competency that supports equitable access to nature-rich learning experiences. By preparing educators to engage children in meaningful interactions with nature, teacher preparation programs can support both child development and environmental stewardship.

Although interest in NbECE continues to grow, less is known about how higher education institutions prepare future educators to implement nature-based pedagogies or how faculty perceive NbECE's role within teacher education. This study builds on prior survey work (Born, 2022; NAAEE, 2023) by examining current practices, barriers, opportunities, and future directions for NbECE across higher education and professional development contexts.

Research Design

This multiple-methods study used surveys to capture both quantitative and qualitative data, thereby reducing single-method bias (Creswell & Plano Clark, 2018). The quantitative data revealed broader trends in the field; the qualitative data provided deep insights into higher education and NbECE. Together, these cumulative results tell a more complete story of current NbECE teacher preparation programs. The survey design was guided by developmentally responsive practice, environmental education, and equity-focused pedagogy, allowing quantitative findings on prevalence and integration to be interpreted alongside qualitative insights about challenges and opportunities.

The survey instrument was customized to assess the presence, integration, and perceived importance of NbECE content in teacher preparation programs. We used Google Forms, which has basic transport and access safeguards to prevent spam, to create, manage, and distribute the survey, which consisted of 18 items with skip logic to direct respondents to appropriate questions¹. The survey was structured as multiple-choice questions, collecting Likert-scale (ordinal) and categorical data. The survey included six optional open-ended response opportunities. Four short-answer questions allowed participants to elaborate on their multiple-choice responses, and two long-form open-ended questions at the end of the survey invited participants to share additional thoughts, ideas, or concerns related to NbECE in higher education and professional development.

¹ The full survey with all questions available in the skip logic format can be found in Supplementary File 1.

The survey was developed by reviewing prior research on NbECE in higher education, including a 2017 baseline survey, and was refined through consultation and pilot testing with NbECE experts within the Natural Start Alliance network to ensure clarity, relevance, and reliability. The instrument was estimated to take 15 minutes to complete, and respondents were allowed to skip items if necessary.

The study received approval from Hamline University's Institutional Review Board. The survey in the present study was open from June through November 2024 and generated 97 responses, compared with 52 responses in 2017. The survey was distributed through professional organizations and networks serving higher education, professional development, and early childhood education audiences, with chain-referral recruitment used to broaden participation.² Participants were informed of the purpose of the research, voluntary nature of participation, confidentiality protections, and the option to withdraw at any time.

Data Analysis

Survey responses to structured items (e.g., Likert-scale, categorical multiple-choice) were analyzed using Microsoft Excel. Descriptive statistics, including frequencies, percentages, and means, were calculated to summarize the presence and integration of NbECE content across teacher preparation programs. Cross-tabulations were used to explore trends across program types, institutional settings, and geographic regions.

While the survey questions guided attention to participants' experiences, perceived barriers, opportunities, and recommendations related to NbECE preparation, the qualitative analysis of open-ended survey responses followed an inductive thematic approach, deriving themes from patterns identified in the data rather than applying a predetermined coding framework. Following Miles, Huberman, and Saldaña's (2020) iterative approach, qualitative responses were analyzed through first-cycle descriptive coding and second-cycle pattern coding to identify broader categories and emergent themes. Using Microsoft Excel, we reviewed each open-ended question separately, organized responses by topic, highlighted recurring ideas with a consistent color-coding scheme, and developed themes iteratively across responses.

Quantitative and qualitative findings were integrated using a combining technique (Plano Clark & Ivankova, 2016). Quantitative data identified patterns in program presence and integration, while qualitative responses contextualized those patterns through participants' experiences, perceptions, and recommendations.

Results

Findings from the 2024 survey suggest both growth and uneven integration in the field of nature-based early childhood education (NbECE). Compared with the 2017 survey, the current survey received more responses and reflected broader participation across higher education and professional development contexts. Across responses, participants described increasing interest in NbECE, but also noted that its presence in educator preparation remains inconsistent, often dependent on individual faculty, institutional priorities, and access to resources.

Findings are presented across descriptive and thematic sections, including respondent characteristics, current offerings, perceived demand, barriers to integration, and future directions. The 2024 survey also added items

² Distribution channels included the Natural Start Alliance, NAAEE, Children & Nature Network, NAEYC teacher education and nature interest forums, selected AERA groups, regional networks, email lists, relevant websites, and social media. Initial contacts were also encouraged to share the survey with colleagues and affiliated networks. . Survey dissemination within the Natural Start Alliance network was tracked systematically using a spreadsheet that documented the date, distribution channel, and contact.

examining whether, where, and how explicit NbECE content appears in coursework, field experiences, training programs, and professional development.

Together, the results point to a field gaining visibility but not yet systematically embedded in educator preparation.

Respondents Reflect a Broad Ecosystem

Geographic Representation: As shown in Figure 1, the survey received responses from professionals across 36 U.S. states and Washington, D.C., for a total of 93 responses from the United States. Minnesota had the highest representation, contributing 10 responses (10.3%), followed by California with 7 (7.2%) and Washington with 5 (5.2%). The remaining U.S. responses were distributed relatively evenly, with states contributing between one and four responses. Three responses came from Canada and one from outside North America, while the overall sample remained primarily U.S.-based.

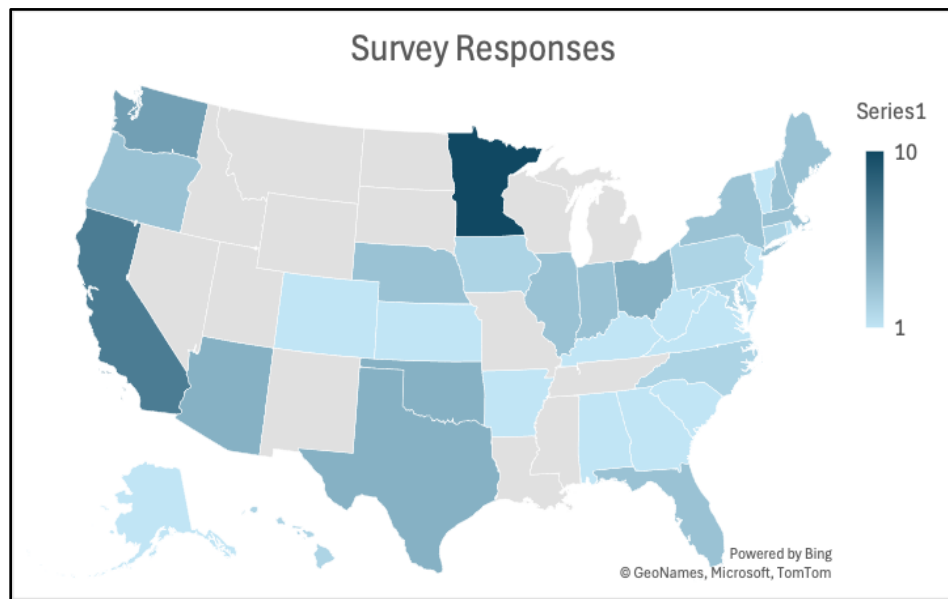


Figure 1: Geographic Representation of Survey Responses; N = 97

Institutional Descriptions: Respondents represented a broad range of institutional types. Public four-year universities and colleges remained the largest group, accounting for 33% of responses (32 of 97), but this was lower than in the 2017 survey, when they accounted for 52% of responses. This shift may reflect the larger response pool and a more diverse mix of institutions involved in NbECE preparation, including professional development providers and community colleges.

This distribution suggests that NbECE preparation is not concentrated solely within traditional four-year teacher preparation programs. Instead, responses point to a broader ecosystem of higher education, community colleges, professional development, and related early learning settings, suggesting that integration may depend as much on coordination across institutions as on changes within individual degree programs.

Professional Role: Respondents also represented a range of professional roles. Full-time faculty in early childhood education or child development formed the largest group (32 respondents, 33%), followed by adjunct or part-time faculty (21 respondents, 22%). The “other” category included 23 respondents (24%) and was broader than in the original survey, encompassing early learning and special education teachers, therapists, professional development specialists, social workers, and naturalists. New response categories in this 2024 survey also captured faculty in environmental education and higher education administrators or directors.

Table 1: Characteristics of Survey Respondents (N = 97)		
Characteristic	n	%
<i>Geographic Representation</i>		
United States	93	95.88%
Canada	3	3.09%
Other	1	1.03%
<i>Institutional Description</i>		
Public four-year universities or colleges	32	32.99%
Private 4-year college/university	13	13.40%
Two-year college/community college	17	17.53%
Professional development organization/provider	23	23.71%
Other	12	12.37%
<i>Professional Role</i>		
Full-Time Faculty in ECE / Childhood	32	32.99%
Adjunct/Part Time ECE Faculty	21	21.65%
Faculty in Environmental Ed	7	7.22%
Consultant/Coach	6	6.19%
Director (for College Program)	5	5.15%
Other Higher Ed Admin Staff	3	3.09%
Other	23	23.71%

Table 1: Characteristics of Survey Respondents

**Note: in "Professional Role" Coach/Consultant was not a listed category on the survey but was found to have a significant presence*

In the "other" category and therefore was pulled out separately for analysis.

Nature-based Early Learning Is Visible but Not Systematically Embedded

This follow-up survey added questions about the explicit integration of NbECE within higher education and professional development settings, including whether content was offered, at what level, and through which courses, programs, or professional learning opportunities. Of the 97 survey responses, 47 (48.5%) indicated they do not offer any programming with a nature-based focus.

The 39 respondents (40.2%) who reported offering NbECE content received follow-up questions about the types of programs or courses provided. A check-box grid asked whether their institutions included 10 types of offerings³ and

³ These ten options were: focus or inclusion of NbECE in mainstream course(s); Specific NbECE courses; Environmental Studies/Environmental Education courses with a focus in NbECE; NbECE DEGREE; ENDORSEMENT in NbECE; NbECE ENDORSEMENT in special education; LICENSURE in early childhood teaching with a focus on NbECE;

whether these appeared at the undergraduate or graduate level, with an “unsure” option for respondents who did not have complete knowledge of all institutional offerings.

Among the ten options provided, the most frequently selected was “Specific NbECE courses,” with 23 respondents indicating such courses were offered at the undergraduate level and six at the graduate level. The second most common option was “Focus or inclusion of NbECE in mainstream course(s),” reported by 16 respondents at the undergraduate level and seven at the graduate level. (see Figure 2).

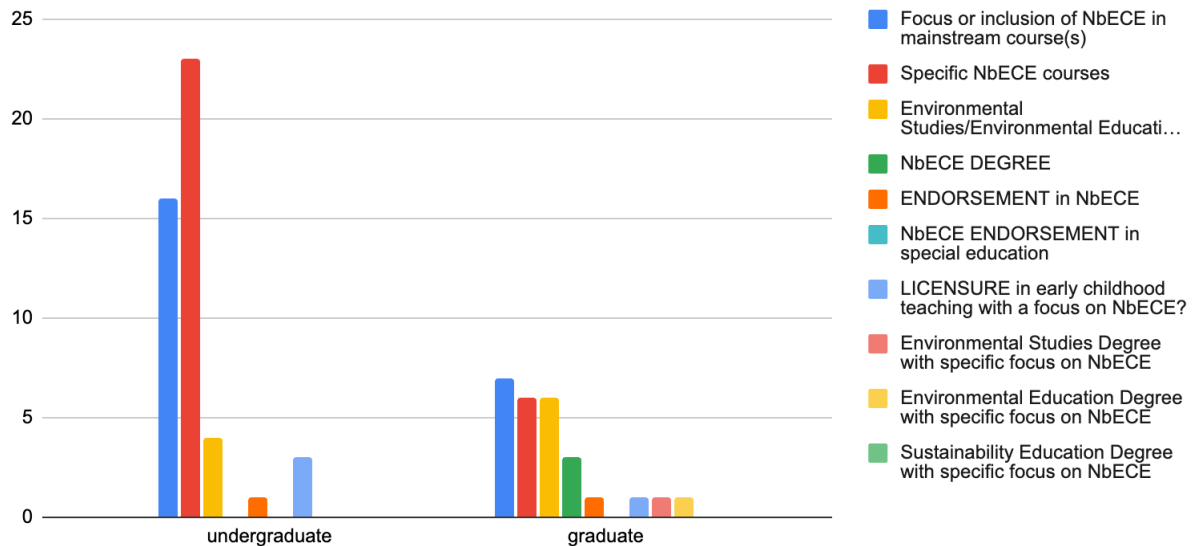


Figure 2: Responses to the Question: Which of the following does your institution offer WITH AN EXPLICIT FOCUS ON NbECE? N = 39

Thirty respondents (out of the 39 directed to this section) shared course or program examples, illustrating varied approaches to NbECE integration. Offerings ranged from introductory courses such as Nature-Based Learning in Early Childhood, Children and Nature, Introduction to NbECE, and Outdoor Learning for Young Children to content embedded in Math Methods for ECE, Science and Nature with Young Children, Leading Inclusion in Nature-Based Programs, and Planning Environments for ECE. Respondents also noted internships, field-based work, practicum experiences, and specialized topics such as risk management.

Determining the Need and Demand

Enrollment Trends: Respondents from institutions offering NbECE programming were asked to describe enrollment trends in NbECE-focused courses over the past three years. Of the 37 respondents who answered this section, enrollment patterns varied as follows:

Environmental Studies Degree with specific focus on NbECE; Environmental Education Degree with specific focus on NbECE; Sustainability Education Degree with specific focus on NbECE

Table 2: Enrollment trend reported by respondents. N = 37

Enrollment Trends N = 37		
	n	%
growing rapidly/always full	3	8.11%
growing steadily	8	21.62%
steady/typical	9	24.32%
low enrollment	5	13.51%
Other	12	32.43%

Respondents who chose the “other” option offered diverse explanations, such as high student interest but low enrollment due to competing course requirements, uncertainty in the early stages of course offerings, or limited knowledge of enrollment data given their role at their institution.

Taken together, these responses suggest that interest appears strongest where programming already exists, but enrollment is shaped by curricular constraints, early-stage course development, and uneven institutional tracking. The pattern is therefore less a simple indicator of student demand than an indication that demand could be shaped by whether programs make NbECE visible, credit-bearing, and feasible within degree pathways.

Student Feedback Indicates Strong Value Within Existing Programs: Respondents also rated student feedback on NbECE-focused courses, offering another indicator of perceived value. Thirty-six of the 39 respondents who filtered to this question answered it as follows:

Table 3: Faculty rating of student feedback. Ratings were provided only by respondents whose institutions offered NbECE-focused programming and who answered this item (n = 36).

Rating of Student Feedback	n	%
1 = Little apparent value	0	0%
2	1	2.8%
3	3	8.3%
4	9	25.0%
5 = Significant value	24	66.7%

Because these ratings come only from respondents with existing NbECE offerings, they should not be read as evidence of universal student demand. Rather, they suggest that when students encounter NbECE coursework, faculty perceive it as highly valued.

Professional Demand Is Strong but Unevenly Legible: All 97 respondents were asked whether they perceived professional demand for NbECE. Most respondents (80%) answered “yes,” while 10 (10%) answered “no” and nine (9%) selected “unsure.” This pattern points to broad perceived demand, but the open-ended responses show that demand is not equally visible across regions, institutions, or policy contexts.

Respondents who perceived demand emphasized growing interest among students, practitioners, and programs, along with the broader professional value of NbECE. They also noted that training and support opportunities are not keeping pace with the expansion of nature-based programming.

“Unsure” responses pointed to regional variation, emerging interest, and difficulty measuring demand without formal data. Some also noted structural barriers, including dominant narratives about “kindergarten readiness” that prioritize traditional academic instruction over nature-based approaches.

Respondents who answered “no” cited systemic barriers to integrating NbECE into teacher preparation, including state mandates, standardized education priorities, and the limited visibility of NbECE programs.

Certification Is Seen as Useful but Potentially Unequal: Respondents were also asked about the perceived value and demand for a national NbECE credential. Sixty respondents (61%) indicated that such a certification would hold value, four (4.1%) responded negatively, and the remainder selected “maybe.” Perceived student demand was more mixed: 57.7% expected moderate demand, while high demand (20 responses, 20.6%) and low demand (21 responses, 21.6%) were nearly evenly split. The responses suggest that certification may support legitimacy and consistency, but respondents also raised concerns about whether credentialing could create additional barriers if it is not aligned with state systems, affordability, and justice-oriented commitments.

Open-ended responses about certification highlighted perceived benefits, concerns, and factors shaping interest. The following themes emerged from the qualitative data.

Legitimization and Professionalization of NbECE: The strongest theme in this open-ended question revolved around legitimization and professionalization within the field. Responses captured the sentiment that a national certification for NbECE would provide formal recognition and legitimacy to the field, elevating its status within the broader early childhood education sector. Respondents emphasized that such a credential would validate NbECE programs and practitioners, reinforcing their expertise and professionalism. One respondent (participant 17) sums it up well, “It would legitimize this kind of education. It would hopefully allow instructors a fair wage. It might help parents feel that this type of education is safe as well as good for their child” while another (participant 63) succinctly states, “The field needs national recognition in order to validate the work that is being done.”

Standardization and Consistency in Training and Practice: Respondents highlighted the need for a standardized curriculum and consistent expectations for NbECE educators. Some discussed a wide variation in how nature-based learning is implemented, leading to inconsistencies in quality, accessibility, and equitable practices. Notable benefits of consistency included comprehensive, reliable training for educators, improved instructional quality, support for equitable hiring practices, and transferable qualifications across states.

Expanding Opportunities for Educators and Programs: The open-ended responses highlighted the need to expand opportunities for educators and programs. There was discussion about how a national NbECE certification would “open doors” for educators by increasing their employability and expanding career options. As noted in participant 4’s response, a certificate would “give teachers more opportunities for employment and choice in their careers.” Other respondents echoed this, stating that a certificate would make teachers more “marketable,” and one noted the importance of national certification being transferable from state to state so that teachers have ownership and choice in employment decisions.

Enhancing Child Development and Environmental Stewardship: Support for certification was also tied to beliefs about children’s learning and environmental stewardship. Respondents emphasized that outdoor play and exploration can support cognitive, social, emotional, and physical development. A certification was perceived as potentially important for these benefits. Beyond individual child outcomes, respondents also stressed that instilling a connection to nature from an early age could have long-term effects on environmental stewardship, encouraging children to grow into adults who care for and advocate for the natural world.

Limitations of a National Certification: Four respondents of this survey answered “no,” a national certification or credential for NbECE, would not be a valuable contribution to early childhood education. The responses opposing a national certification for nature-based early childhood education (NbECE) highlight concerns around practicality and equity. Some argue that unless the certification aligns with state-specific teacher training requirements, it would have little practical value, as states may be reluctant to recognize credentials from outside their own systems. Others emphasize that the field has more pressing advocacy priorities, such as improving teacher pay, reducing class sizes, increasing resources, and fostering diversity and inclusion. Additionally, there are concerns that a certification might not adequately address justice and equity in outdoor learning, potentially reinforcing existing racial and social dynamics rather than centering anti-bias, anti-racist work.

Student demand for a national certificate: Most respondents anticipated moderate demand. While many perceived strong interest in outdoor learning, they also noted barriers such as time constraints, financial limitations, and competing academic or professional priorities.

Respondents Link Support to Infrastructure, Partnerships, and Institutional Investment

The final optional question asked higher education professionals whose programs have an NbECE focus what institutions could do to better support them and the NbECE community. Fifty-five respondents answered; three reported already feeling well supported, while the remaining 52 had a variety of suggestions including additional funding and resources, stronger integration into teacher preparation, and expanded networks for collaboration and professional development. These suggestions indicate that respondents saw support not only as a matter of individual faculty interest, but also as a need for infrastructure, institutional commitment, and partnerships.

The most common suggestion was adding more NbECE-focused courses, mentioned by 19 of the 55 respondents. Other frequent recommendations included dedicated resources such as outdoor spaces and lab schools. These responses suggest that stronger NbECE preparation depends on both curricular inclusion and the material conditions that allow educators to practice nature-rich pedagogy. These themes are summarized in Table 4 with representative quotes.

Table 4: Themes within: What can institutions do to better support NbECE professionals and community?

Theme	Number of Responses with this theme (n = 55)	Representative quotes
Courses/PD	19	<i>Allowing for specific courses to be taught that focus on nature-based knowledge/skills would be wonderful. I would also like support on how to best integrate some of this content into existing courses (participant 4)</i> <i>Be open to providing more courses (participant 76)</i> <i>Build it into all coursework the same way we do other critical knowledge such as diversity, ethics, etc. (participant 26)</i>
Resources/space	9	<i>accessible outdoor space to practice skills in (participant 51)</i> <i>Make sure that they have on-site space for outdoor learning (participant 63)</i> <i>development of on campus lab schools and other model programs (participant 32)</i>

		<i>Provide more resources (participant 7)</i>
Funding	9	<i>Fund NB projects and programs (participant 16)</i> <i>Financially support this type of programming with course fees and the ability to do travel courses and field trips (to visit nature based programs) (participant 34)</i> <i>Funding and marketing support (participant 13)</i>
Advocacy Representation and	8	<i>Hire more professors with NbECE experience (participant 34)</i> <i>Awareness campaigns for general public, for parents and for students of all the disciplines so the importance of NbECE will be recognized (participant 93)</i> <i>have a nature based research chair (participant 51)</i> <i>have a professional representing nature based early education on our advisory committee (participant 23)</i> <i>A national push (advocacy) toward NbECE (participant 8)</i>
Networking/partnerships	8	<i>More open conversations and networking with others doing this type of work (participant 85)</i> <i>Additional collaboration with state licensing requirements for outdoor nature based programs (participant 43)</i> <i>HIED institutions can develop and work in partnership with NbECE providers on matters of (a) credit for PD courses/offerings, and (b) technical assistance with assessment, research, and evaluation matters (participant 89)</i>
Research	4	<i>Research in NBEC (participant 22)</i> <i>Continue to seek answers to issues of urban equity with NbECE (participant 95)</i>

Discussion

Programmatic Growth Amid Structural Gaps

Findings from this study indicate that NbECE is experiencing continued expansion across higher education and professional development contexts in North America, reflected in increased course offerings, practitioner interest, and policy recognition. This growth aligns with national trends documenting the rapid increase in nature-based early learning programs and outdoor preschools (NAAEE, 2023), as well as state-level revisions to licensing standards that increasingly acknowledge outdoor classrooms and nature-based learning (Harrington, 2025).

At the same time, expansion has not yet led to consistent integration in early childhood teacher preparation. Nearly half of respondents reported that their institutions do not offer programming with an explicit nature-based focus in early childhood. For early childhood environmental education, this matters because prepared educators help

determine whether environmental learning becomes a regular part of birth-to-eight practice or remains an enrichment available only in some programs. This finding extends Born's (2022) earlier survey and mirrors broader critiques that environmental and sustainability education remain underemphasized in preservice teacher preparation (Alfonso et al., in press; Davis & Elliott, 2014; Ferreira et al., 2015).

Uneven Integration and Emerging Opportunities

The findings also highlight tensions characteristic of a field in transition. Standalone NbECE courses and isolated professional development offerings were the most common forms of integration, often sustained by individual faculty members or external providers. These efforts reflect meaningful innovation but also reveal the fragility of NbECE in systems without formal structures to support it.

This pattern echoes scholarship on the integration of other equity-oriented and reform-based movements in early childhood, including anti-bias education (Derman-Sparks & Edwards, 2010), culturally sustaining pedagogies (Paris & Alim, 2017), preparation for multilingual learners (Lucas & Villegas, 2013), and Universal Design for Learning practices (Chapman, 2024). Like these areas, NbECE appears to be navigating a moment of innovation and growing interest, yet lacks consistent placement in core preparation pathways.

Demand for NbECE Programming: Contextual and Relational

Most respondents perceived professional demand for NbECE (80.2%), but described it as uneven and shaped by state mandates, regional culture, institutional priorities, and dominant narratives about academic readiness. This finding complicates linear models of demand and aligns with scholarship describing teacher preparation and professional learning as relational systems influenced by policy, labor conditions, and cultural values (Cochran-Smith et al., 2016).

Although most respondents saw value in a national NbECE credential, they were less certain about student demand. Respondents identified potential benefits such as legitimacy, consistency, and professional recognition, but also raised concerns about cost, portability, and alignment with licensure requirements. These concerns mirror broader challenges across the early childhood workforce, where participation in additional credentials is often constrained by structural barriers such as cost, time, compensation, and workforce instability, rather than by a lack of professional interest (Schachner et al., 2025; Bassok et al., 2023).

Taken together, these findings suggest that expanding NbECE preparation requires more than adding courses or credentials. Equity appeared in the data primarily as a concern embedded in access, credentialing, resources, and institutional support rather than as a separately measured outcome. This finding means respondents identified conditions that could limit who benefits from NbECE preparation. As an implication, future program development should deliberately attend to affordability, transportation, field placement access, culturally responsive pedagogy, licensing alignment, and environmental justice. Without such alignment, NbECE risks remaining an optional enhancement rather than a core dimension of high-quality, equitable early childhood education.

Implications

Systematic reviews of research studies affirm that learning in nature increases children's agency, engagement, academic learning, and social skills, and that teacher preparation programs should focus on facilitating learning in natural settings (Ardoin & Bowers, 2020; Mann et al., 2022). Our research points to concrete strategies for strengthening NbECE within teacher preparation, professional learning, and policy. At the child level, these strategies are ultimately about broadening access to consistent, developmentally appropriate environmental learning experiences from birth to age 8. Yet, communicating the value of NbECE to institutional decision-makers requires linking children's positive foundational and cognitive outcomes in nature-based education programs and the ECE workforce's readiness to meet the demand for teachers trained in environmental science, learning in the outdoors, and early child development. In response, higher education must address both professional demands and educational changes that increase the pedagogical content knowledge that students will need to be effective NbECE

teachers. As early childhood educators incorporate more nature-focused pedagogies into their practices, teacher preparation programs should adapt coursework to include NbECE concepts, so educators are prepared to support children's environmental and science learning in, with, and for nature.

In higher education, nature-based approaches should be more deliberately embedded throughout core coursework so that all teacher candidates encounter these principles. Programs such as the University of Cincinnati's Nature-Based Early Learning course and Florida Atlantic University's Nature-Based Early Learning/Early Childhood Environmental Education specialization demonstrate how higher education institutions are beginning to integrate nature-rich curriculum content, field experiences, and environmental education into teacher preparation pathways (Bhagwanji et al, 2025). Nature-based field placements should be vetted and expanded, and partnerships with laboratory schools, nature reserves, and other programs implementing high-quality NbECE should be strengthened. Structured field experiences are especially important because they provide repeated opportunities for candidates to practice facilitating children's play and learning outdoors. Faculty development is also essential for implementation and should include sustained opportunities to engage with NbECE theory and research, collaborate with community partners, and model outdoor teaching practices (Carr, 2025).

The opportunity for high-quality professional learning systems that align with higher education pathways is paramount to creating a strong NbECE workforce. This type of workforce development can create a pipeline of talented educators by connecting higher education, professional learning, and ongoing support to ensure adaptability and continuing education, rather than short-term or one-shot professional development offerings. Such systems support ongoing knowledge and skill development, which is crucial for both educator retention and high-quality programming for young children.

Finally, the policy and advocacy implications of NbECE identified in this study clearly call for coordination among NbECE experts, higher education institutions, and licensing specialists. As more states revise licensing standards to include outdoor or nature-based education, integrating NbECE competencies into credentialing frameworks could help ensure more consistent professional standards while preserving the approach's essential tenets. Policymakers must understand the mission and complexity of NbECE so that arbitrary rules or policies do not inhibit equitable access, the spontaneity and relational nature of outdoor learning, child agency, or the role of nature as a co-teacher. Equitable policy frameworks could also include field-placement stipends, community-partnership infrastructure, and incentives for higher-education programs to broaden access and accommodate diverse candidate needs. Together, these efforts can strengthen the quality, coherence, and sustainability of NbECE within the broader early childhood professional ecosystem.

Limitations and Future Directions

Although the survey included respondents from Canada, the findings should be interpreted primarily within the U.S. context. The survey was developed based on the landscape of higher education and professional development opportunities in the United States and was primarily disseminated through U.S.-based networks. While the inclusion of Canadian respondents provides insight into broader North American interest in NbECE, the small number of Canadian participants does not allow for comparisons across national contexts. Future research should examine how educator preparation for NbECE varies across different policy, cultural, and educational contexts, including Canada.

Additionally, the survey captured perspectives from higher education faculty and professional development professionals; the sample may not fully represent all teacher preparation programs or regional variations in NbECE integration. Programs that are less visible, under-resourced, or recently established may be underrepresented, potentially biasing findings toward programs already engaged with nature-based approaches. We must also acknowledge that the data were self-reported, reflecting participants' perceptions of value, relevance, and structural challenges; these perceptions may differ from actual institutional practices or student experiences. While the study identifies structural barriers such as gaps in coursework, limited field placements, and funding constraints, it does not measure the long-term impacts of NbECE integration on teacher preparedness or children's learning outcomes. Finally, as NbECE continues to evolve rapidly, programmatic practices, policy contexts, and professional development offerings may change, limiting the generalizability of these findings to future conditions.

These limitations suggest several directions for future research. Longitudinal studies are needed to examine how integrating NbECE into teacher preparation and professional development affects both educator practice and child outcomes over time. Comparative research across regions and program types could illuminate structural and contextual factors that support or hinder successful implementation. Additionally, qualitative investigations of student and teacher experiences in nature-based programs would provide richer insights into how NbECE pedagogy translates into practice. Finally, research focused on equity and access is critical to ensure that all teacher candidates, regardless of institutional or community context, have opportunities to engage in high-quality nature-based learning experiences.

Conclusion

Nature-based early childhood education is at a pivotal moment in the United States, with growing interest from educators, rising policy recognition, and increasing evidence of its value for developmentally appropriate, culturally responsive, and sustainability-focused teaching. This study highlights both the promise and the persistent challenges of integrating NbECE into teacher preparation and professional development. Findings indicate that while NbECE is increasingly visible across higher education and professional development contexts, its integration remains uneven and often depends on individual faculty, institutional support, and available resources. Addressing these challenges requires coordinated action across preparation, professional learning, and policy to better equip educators to foster children's holistic development, environmental literacy, and meaningful connection to the natural world.

References

- Alfonso, S. (2024). Histories, theories, and contemporary considerations of nature-based early childhood education: Roots to branches. In *Fostering an ecological shift through effective environmental education* (pp. 262-289). IGI Global Scientific Publishing.
- Alfonso, S., Carr, V., & Gessler, M. (in press). Pedagogy and Environments that Support Children's Agency: Discrepancies between Educator Preparation and ECEFS Practice in the USA. In E. Årlemalm-Hagsér, V. Carr, & S. Elliott (Eds.). *The Bloomsbury Handbook of Early Childhood Education for Sustainability*. Bloomsbury.
- Ardoin, N. M. & Bowers, A. W. (2020). Early childhood environmental education: A systematic review of the research literature, *Educational Research Review*, 31,100353. <https://doi.org/10.1016/j.edurev.2020.100353>.
- Bassok, D., Bellows, L., Markowitz, A. J., & Miller-Bains, K. (2023, April 11). *Building a professional early childhood workforce requires a "compensation-first" approach*. Brookings Institution. <https://www.brookings.edu/articles/building-a-professional-early-childhood-workforce-requires-a-compensation-first-approach/>
- Barrable, A., Touloumakos, A., & Lapere, L. (2022). Exploring student teachers' motivations and sources of confidence: The case of outdoor learning. *European Journal of Teacher Education*, 45(3), 356–372. <https://doi.org/10.1080/02619768.2020.1827386>
- Bhagwanji, Y., Carr, V., & Boileau. (November, 2025). *Insights from Three Nature-Based Early Learning Undergraduate Degree Programs*. [Conference Presentation]. North American Association for Environmental Education. Virtual.
- Born, P. (2022). "It's All over the Map": A Report on Nature-Based Early Childhood Teacher Preparation Programs in the United States. *International Journal of Early Childhood Environmental Education*, 9(2), 69-82.
- Brown, L., & Robison, B. (2021). *Outdoor preschool policy action framework*. Willamette Partnership. https://willamettepartnership.org/wp-content/uploads/2021/03/Outdoor-Preschool-Policy-Action-Framework_FINAL-for-web.pdf
- Carr, V. (November, 2025). *For children and the planet: Nature-based early learning in ECE preservice programs*. [Conference Presentation]. National Association of Early Childhood Teacher Education. Orlando, FL.
- Carr, V., Brown, R. D., Schlembach, S., & Kochanowski, L. (2017). Nature by design: Playscape affordances support the use of executive function in preschoolers. *Children, Youth and Environments*, 27(2), 25-46.
- Carr, V., Ernst, J., & Ridge, S. W. (2025). Connection, Curiosity, and Care: An E-STEM Approach to Climate Change Education in Early Childhood. *Young Children*, 80(4),18-28.

- Chapman, R. A. (2024). Universal Design for Learning (UDL): Investigating Faculty Perspectives. [Doctoral dissertation, Bradley University]. ERIC Number: ED661688.
- Clark, V. L. P., & Ivankova, N. V. (2016). *Mixed methods research: A guide to the field* (Vol. 3). Sage publications.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (Fourth edition.). SAGE.
- Davis, J., & Elliott, S. (2014). *Research in Early Childhood Education for Sustainability: International Perspectives and Provocations*. Routledge.
- Derman-Sparks, L., & Edwards, J. O. (2010). *Anti-bias education for young children and ourselves*. Washington, DC: National Association for the Education of Young Children.
- Ernst, J., & Burcak, F. (2019). Young Children's Contributions to Sustainability: The Influence of Nature Play on Curiosity, Executive Function Skills, Creative Thinking, and Resilience. *Sustainability*, 11(15), 4212. <https://doi.org/10.3390/su11154212>
- Ernst, J. (2014). Early childhood educators' use of natural outdoor settings as learning environments: an exploratory study of beliefs, practices, and barriers. *Environmental Education Research*, 20(6), 735–752. <https://doi-org.offcampus.lib.washington.edu/10.1080/13504622.2013.833596>
- Ferreira, J., Ryan, L., & Tilbury, D. (2007). Planning for Success: Factors Influencing Change in Teacher Education. *Australian Journal of Environmental Education*, 23, 45–55. doi:10.1017/S0814062600000707
- Harrington, K. (2019). *Licensing outdoor & nature-based preschools, in Washington State and beyond*. Natural Start Alliance. <https://naturalstart.org/resources/articles/licensing-outdoor-nature-based-preschools-washington-state-and-beyond>
- Harrington, K., & Yair, A. (2025). *Recommendations for Licensing Outdoor, Nature-Based Early Learning and Child Care Programs*. Natural Start Alliance.
- Harwood, D., Boileau, E., Dabaja, Z., & Julien, K. (2020). Exploring the national scope of outdoor nature-based early learning programs in Canada: Findings from a large-scale survey study. *The International Journal of Holistic Early Learning and Development*, 6, 1-24.
- Larimore, R. (2016). Defining nature-based preschools. *International Journal of Early Childhood Environmental Education*, 4(1), 32-36.
- Lawson Foundation. (2024). *More than a new course: A framework for embedding outdoor and land-based pedagogies in post-secondary ECE programs*. Lawson Foundation. <https://lawson.ca/MoreThanANewCourse.pdf>
- Lucas, T., & Villegas, A. M. (2013). Preparing linguistically responsive teachers: Laying the foundation in preservice teacher education. *Theory Into Practice*, 52(2), 98–109.
- Mann, J., Gray, T., Truong, S., Brymer, E., Passy, R., Ho, S., Sahlberg, P., Ward, K., Bentsen, P., Curry, C., & Cowper, R. (2022). Getting out of the classroom and into nature: A systematic review of nature-specific outdoor learning on school children's learning and development. *Frontiers in Public Health*, 10, 877058. <https://doi.org/10.3389/fpubh.2022.877058>
- McCormick, R. (2017). *Does access to green space impact the mental well-being of children: A systematic review*. *Journal of Pediatric Nursing*, 37, 3–7. <https://doi.org/10.1016/j.pedn.2017.08.027>
- Miles, M. B., Huberman, M. A., & Saldana, J. (2020). *Qualitative Data Analysis* (4th ed.). SAGE Publications.
- Moseley, C., Reinke, K., & Bookout, V. (2002). The Effect of Teaching Outdoor Environmental Education on Preservice Teachers' Attitudes toward Self-Efficacy and Outcome Expectancy. *Journal of Environmental Education*, 34(1), 9–15.
- Moses, A. (2025). Educating Young Children in a Changing Climate: Impacts on Programs and Practices. *Young Children*, 80(4), 4-5.
- North American Association for Environmental Education. (2019). *Nature-based preschool professional practice guidebook*. Washington, DC: NAAEE
- North American Association for Environmental Education (NAAEE). (2020). *Nature-Based Preschools in the US: 2020 Snapshot*. Washington, DC: NAAEE.
- North American Association for Environmental Education (NAAEE). (2023). *Nature Preschools in the United States: 2022 National Survey*. Washington, DC: NAAEE.
- O'Brien, L., & Murray, R. (2007). *Forest School and its impacts on young children: Case studies in Britain*. *Urban Forestry & Urban Greening*, 6(4), 249–265. <https://doi.org/10.1016/j.ufug.2007.03.006>

- Paris, D., & Alim, H. S. (Eds.). (2017). *Culturally sustaining pedagogies: Teaching and learning for justice in a changing world*. Teachers College Press.
- Scott, J. T., Kilmer, R. P., Wang, C., Cook, J. R., & Haber, M. G. (2018). Natural Environments Near Schools: Potential Benefits for Socio-Emotional and Behavioral Development in Early Childhood. *American Journal of Community Psychology*, 62(3–4), 419–432. <https://doi.org/10.1002/ajcp.12272>
- Schachner, A., Wang, V., Yun, C., Plasencia, S., Mauerman, C., McJunkins, C., & Stipek, D. (2025). Credentialing early childhood teachers: Considerations for policymakers [Policy brief]. Learning Policy Institute. <https://learningpolicyinstitute.org/product/ece-credentialing-policy-makers-brief>
- Torquati, J., Cutler, K., Gilkerson, D., & Sarver, S. (2013). Early Childhood Educators' Perceptions of Nature, Science, and Environmental Education. *Early Education and Development*, 24(5), 721–743. <https://doi-org.offcampus.lib.washington.edu/10.1080/10409289.2012.725383>
- Wells, N. M., & Evans, G. W. (2003). Nearby Nature: A Buffer of Life Stress among Rural Children. *Environment and Behavior*, 35(3), 311–330. <https://doi.org/10.1177/0013916503035003001>
- Wiedel-Lubinski, M. (2026). Nature-based early childhood education. National Association for the Education of Young Children: Washington, DC
- Wright, M. B., Konerman, R., Kochanowski, L., & Carr, V. (2025). Socioeconomic diversity in laboratory preschools: Imperatives for democracy and sustainability. In M. R. L. Odell, T. J. Kennedy, B. Meyer, & J. R. Sarada (Eds.). *The how and why of laboratory schools: Innovations and success stories in teacher preparation and student learning*. (pp Myers Education Press.

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Teacher education and NbECE

A team of researchers is partnering with [redacted] to understand how we prepare educators to work in nature-based early childhood education, particularly through higher education.

This survey was originally distributed [redacted]. We are repeating this survey to add to our body of knowledge, understand change in the field, and publish a national report on the state of nature-based early childhood education (NbECE) teacher preparation in higher education. We also hope to identify potential areas for advocacy and growth.

For purposes of this survey, we are interested in programs or courses which fit broadly into our understanding of nature-based early childhood education and may include the following terms: "early childhood environmental education," "early childhood education for sustainability," "place-based early childhood education," "early childhood special education," "early childhood education." Again, we are interested in programs that specifically address the role of nature in early learning.

If you have specific questions about this survey, please contact [redacted]

Alternatively, you may contact [redacted]

Important-informed consent

This survey will take approximately 15 minutes to complete and participation is completely voluntary. The survey is structured as multiple-choice questions with optional open-ended short answers. If you feel the multiple choice and short form answers do not adequately address your needs, the survey concludes with optional long-form open-ended questions which allows you to share additional thoughts, ideas, or concerns.

You may skip any open-ended question in which you would not like to participate, by clicking "next."

You may stop at any time, without penalty or harm. There is no risk to you for participating. The benefit to you is knowing that you are contributing to a better shared understanding of the opportunities and challenges associated with teacher preparation and nature-based early childhood education.

The information you provide will not be sold, shared, or used except for the purposes of this survey explained above. Your contact information will not be collected. You will have the option to provide your email upon completion of the survey. If you choose to share it, it will be used only for the purposes described herein.

If you agree, continue to the next section. Continuing to the next section indicates your consent to participate.

Demographics

1. Which of the following best describes your institution? *

Check all that apply.

- ☐ Public 4-year University/College
- ☐ Private 4-year University/College
- ☐ Community College/2-year Program
- ☐ Vocational or Technical School
- ☐ Professional Development Provider that works with licensing or department of education
- ☐ Independent Professional Development Provider
- ☐ Other: _____

2. In which state is your institution located? *

3. Optional-please provide the name of your institution

4. Which of the following role(s) best describes your primary role at the above institution. *

Check all that apply.

- ☐ Full-time Faculty in Early Childhood or Elementary Education
- ☐ Full-time Faculty in Environmental Education
- ☐ Adjunct or Permanent Part-Time Faculty
- ☐ Visiting Faculty
- ☐ Program Director/Chair/Coordinator for College Program
- ☐ Laboratory/Demonstration School Director
- ☐ Other Administrative Staff
- ☐ Other: _____

5. Does your institution offer ANY programming WITH AN EXPLICIT FOCUS ON NbECE? *

(this can include course content, specific NbECE courses, degrees, programs, endorsements, licensure, etc).

Mark only one oval.

- ☐ Yes — Skip to question 6
- ☐ No — Skip to question 11
- ☐ Unsure — Skip to question 10

Yes - EXPLICIT FOCUS ON NbECE

6. Which of the following WITH AN EXPLICIT FOCUS ON NbECE does your institution offer? Check all that apply:

Check all that apply.

Program/course	yes - undergraduate	yes - graduate	no / unsure
Focus or inclusion of NbECE in mainstream course(s)	☐	☐	☐

Specific NbECE courses	☐	☐	☐
Environmental Studies/Environmental Education courses with a focus in NbECE	☐	☐	☐
NbECE DEGREE	☐	☐	☐
ENDORSEMENT in NbECE	☐	☐	☐
NbECE ENDORSEMENT in special education	☐	☐	☐
LICENSURE in early childhood teaching with a focus on NbECE?	☐	☐	☐
Environmental Studies Degree with specific focus on NbECE	☐	☐	☐
Environmental Education Degree with specific focus on NbECE	☐	☐	☐
Sustainability Education Degree with specific focus on NbECE	☐	☐	☐

7. Optional- Please list course which focus on NbECE or include a connection to NbECE?

8. How would you describe enrollment in NbECE-focused courses over the past 3 years?

Mark only one oval.

- ☐ Some interest, but low enrollment
- ☐ enrollment is steady or so-so; about typical
- ☐ enrollment is growing steadily
- ☐ enrollment growing rapidly, we can hardly keep up
- ☐ Other: _____

9. How would you rate students' formal and informal feedback on the value of specific NbECE content over the past 3 years?

Mark only one oval.

1	2	3	4	5
Little apparent value				Students find courses very valuable

Unsure

10. You answered "unsure" to NbECE programming at your institution. Please explain.

Determining the need

11. In your personal opinion, is there professional demand for intentionally designed NbECE training and coursework in higher education/teacher preparation settings? *

Mark only one oval.

☐ Yes — Skip to question 12

☐ No — Skip to question 13

☐ Other: _____

Yes, there is a professional demand

12. You answered "yes" to a professional demand for intentionally designed NbECE training and coursework.

Optional- What is the professional demand of such a concentration and do you believe it adds value to teacher preparation programs. If so, how?

No, there is not a professional demand

13. Optional - Why is there NOT professional demand for intentionally designed NbECE training and coursework in higher education/teacher preparation settings?

"other" professional demand

14. You listed "other" to a professional demand for intentionally designed NbECE training and coursework.

Optional - please explain.

Certification and Accreditation for the field

15. If there were a national certification or credential for NbECE, would that be a valuable contribution to the early childhood education field? *

Mark only one oval.

☐ Yes — Skip to question 16

☐ No — Skip to question 17

☐ Maybe — Skip to question 18

Certification valuable

16. Why would a national certification or credential for NbECE be valuable to the early childhood field

Certification NOT valuable

17. Why would a national certification or credential for NbECE NOT be valuable to the early childhood field

Certification may be valuable

18. Why would a national certification or credential for NbECE possibly be valuable to the early childhood field

Certification and Accreditation for the students

19. If a national certification or credential for NbECE existed, do you think the demand among students would be...? *

Mark only one oval.

- ☐ low — Skip to question 20
- ☐ moderate — Skip to question 21
- ☐ high — Skip to question 21

NOT appeal to students

20. Why might an NbECE credential NOT appeal to students?

Appeal to students

21. Why might an NbECE credential appeal to students?

Final Thoughts

22. If you are a higher-ed professional with an NbECE focus, what can the higher-education institutions do to better support you and the NbECE community?

23. Please share any additional thoughts, ideas, concerns about the future of NbECE teacher preparation in higher education:

Optional Contact Info:

Your support, feedback, and insight are invaluable to us. Below, you have the option to share your contact information for possible further inquiry. Including contact information is completely voluntary. It will only be used for survey-related communication purposes.

If you choose not to share contact info, leave blank and scroll down to "submit"

24. Name:

25. email:

26. phone number:

27. How may we contact you if we have follow-up questions, or are interested in your further thoughts?

Check all that apply.

☐ Email

☐ Phone

THANK YOU for your participation and time!
We appreciate your commitment to this work!

Parental Sustainability Talk during Shared Book Reading and its Association with Preschoolers' Hope

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ABSTRACT

Although sustainability education is increasingly emphasized from an early age, little is known about how family literacy practices, such as Shared Book Reading (SBR), contribute to children's understanding of sustainability and related psychological resources, such as hope—a cognitive–emotional construct involving agency (goal-directed thinking) and pathways (strategies for reaching goals). The study examined the nature of SBR at home as a context for sustainability education and explored its associations with children's hope. Participants were 57 parent–preschooler dyads (aged 4–6). Parents read two urban gardening picture books that differed in the explicitness of their sustainability message (explicit vs. implicit). Parent–child interactions were video-recorded and transcribed. Researchers coded parents' extra-textual sustainability-related utterances and assessed children's hope. Results showed significantly richer sustainability-related parental discourse when reading the book with explicit sustainability content. At the same time, correlations across the two books indicated consistency in parents' scaffolding style. Importantly, parents' scaffolding was positively associated with children's hope levels. These findings highlight SBR as a promising and accessible context for early sustainability education. They further suggest that parental scaffolding during reading may contribute to the development of children's hope, a psychological resource that may support future engagement with environmental challenges.

Keywords: Early childhood; Environmental education; Family literacy; Parent–child discourse; picture books; Socio-emotional development

The World Commission on Environment and Development (1987) introduced the concept of sustainable development, defining it as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (p. 16). This definition broadened the understanding of sustainability beyond environmental protection to encompass the interrelated dimensions of environmental integrity, social equity, and economic well-being. As such, sustainability is increasingly viewed as a multidimensional concept that requires individuals and communities to consider the long-term consequences of their actions for both present and future generations (UNESCO, 2017).

Researchers argue that early childhood settings play an important role in fostering children's sense of responsibility, empathy, participation, and hope, thereby laying the foundations for sustainable ways of living and learning throughout the lifespan. Parents play an important role in introducing young children to a wide range of environmental values and practices (Sihadi et al., 2017). The concept of sustainability encompasses multiple meanings (Vogt & Weber, 2019), yet all perspectives emphasize the need for behavioral and lifestyle changes to improve current conditions. These changes are shaped through everyday practices in the family and educational

settings, which constitute the child's most immediate microsystems within the broader ecological system of development (Bronfenbrenner, 1979).

Parent-child Shared Book Reading (SBR) is a common activity in many families and provides rich opportunities for conversation about ideas and experiences (e.g., Brekke Stangeland et al., 2024). As such, SBR may provide a meaningful context for introducing sustainability-related ideas to young children. In the present study, we focused on the environmental aspect of sustainability, examining educational efforts to promote environmental awareness and urban gardening in a highly industrialized urban setting.

Beyond its well-documented contribution to children's language development (e.g., Korat et al., 2018), shared reading has also been shown to support young children's social-emotional development (e.g., Schapira & Aram, 2026; Wirth et al., 2022). Within this context, the present study examines parents' discourse about sustainability with their preschool children and its relation to children's hope. Snyder (2002) conceptualizes hope as a cognitive-emotional belief system involving goal-directed thinking (agency) and the ability to generate pathways toward goals, enabling individuals to cope with challenges and adapt to change (Marques & Lopez, 2017). By examining parents' discourse during SBR and its association with children's hope, this study aims to clarify how families discuss sustainability with young children and to contribute to the growing body of research linking SBR with children's socio-emotional resources in early childhood.

Early Education for Sustainability

Education for Sustainable Development has emerged as a key educational framework for promoting sustainable futures. It seeks to empower learners with the knowledge, skills, values, and dispositions necessary to make informed decisions and act responsibly in ways that support environmental stewardship, social justice, economic responsibility, and global citizenship (UNESCO, 2017, 2020). Rather than focusing solely on environmental issues, education for sustainable development emphasizes holistic thinking, critical reflection, participation, and agency, enabling learners to address complex societal challenges and contribute to sustainable communities.

UNESCO has identified education for sustainability as a pressing global priority for 2020–2030 and a central means of transmitting sustainability values to future generations while encouraging the lifestyle changes needed to achieve sustainability goals (UNESCO, 2020). Accordingly, sustainability education has been increasingly integrated into educational systems worldwide, spanning all levels of education from early childhood settings to higher education institutions (UNESCO, 2024). Alongside conceptual knowledge, sustainability education also aims to foster personal competencies that enable individuals to take action and contribute to positive environmental change (Scoffham & Rawlinson, 2022).

Contemporary approaches emphasize three interconnected dimensions of sustainability: environmental sustainability, which involves caring for the natural world; social sustainability, which promotes inclusion, well-being, democratic participation, relationships, and peace; and economic sustainability, which encourages responsible consumption and thoughtful use of resources in developmentally appropriate ways (Davis, 2023; Samuelsson & Kaga, 2008).

In early childhood education, sustainability education shows considerable conceptual flexibility. In their literature review, Hedefalk and colleagues (2015) identified two main approaches to sustainability education in early childhood. The first focuses on learning about the environment, emphasizing children's acquisition of knowledge about nature—such as natural cycles, animals, and plants—often combined with experiences in natural environments. This approach commonly uses direct teaching strategies such as explanations and stories. The second approach conceptualizes sustainability as integrating environmental, social, and economic dimensions. Educators who adopt this perspective address environmental issues while also engaging children with broader social themes, such as justice, equality, and democratic participation. Across both approaches, the goal is to encourage young children to act in ways that support sustainability. Accordingly, sustainability education seeks to foster children's awareness and guide them to reflect on everyday practices and make environmentally responsible decisions, such as recycling (Furu et al., 2023).

Olof and Osbeck (2018) call for integrating moral dimensions into sustainability education by reading relevant literature. In their study, the researchers examined six youth books and identified themes related to sustainability, such as concern for animals and nature, the ability to enjoy nature, practical thinking and doing good, the ability to lead a healthy life, the capacity to imagine and think through narrative scenes, and the ability to form attachments to people and objects. According to the authors, sustainability literature can help readers understand what actions are expected of them to realize the vision of sustainability: protecting nature and using natural resources responsibly to ensure quality of life for the present generation while also safeguarding them for future generations. The authors therefore advocate for continued identification of sustainability principles in children's and youth literature and for reading books that address sustainability, namely, the relationship between humans and the Earth, within educational settings.

Shared Book Reading as a Context for Sustainability Understanding

In Western society, Shared Book Reading (SBR) is part of young children's daily routines at home and in educational settings (e.g., Zucker et al., 2013). Reading a book distances the reader from the situation and facilitates discussion of the character's feelings, motivations, and behaviors. When parents talk with their children about a book, they bridge the book's content and the child, mediating the text's meaning. According to Vygotsky's developmental theory (Winsler, 2003), adults help children understand and notice aspects that they may find difficult to perceive or comprehend independently. Through adult scaffolding, children learn to understand and gain control over content and skills that were previously less clear, supporting their development.

Some studies indicate that a book's characteristics are associated with the way adults share books with children (Henkaline & Wagner, 2020). For example, Bergman Deitcher and Johnson (2022) found that book genre influences parent-child discourse. Specifically, when reading informational books, parents provided cognitively richer support and used more varied vocabulary than when reading narrative books. When reading narrative books, the protagonist matters. When reading books on the same theme, parental discourse was richer when the book's protagonist was human rather than an animal (Aram et al., 2026). Book design also plays an important role. Bergman-Deitcher and colleagues (2021) studied shared reading of alphabet books and found that parents provided more support for the writing system when reading the less visually and textually dense book. The current study explored whether parents' reading and discourse vary with the book's level of implicitness.

SBR demonstrates consistent positive effects on children's language development (Galea et al., 2025) as well as on early literacy skills and literacy achievement (Inoue et al., 2018). Beyond these, growing attention has focused on the links between parent-child discourse during shared reading and children's socio-emotional development and behavior. For example, Schapira and Aram (2020) found that parents' socio-emotional utterances during book reading predicted children's ability to explain emotions, their level of empathy, and their expression of prosocial behavior. Other studies have found associations between shared book-reading discourse and children's moral understanding and behavior (Chou et al., 2021) and social behavior (Chen et al., 2025). The present study seeks, for the first time, to examine the relationship between SBR and the development of hope, with a specific focus on an aspect of the sustainability domain – protecting the environment, gardening in cities.

Hope

According to Snyder (2002), hope is a cognitive-emotional construct whose presence enables individuals to set goals (agency thinking) and to act in varied ways to achieve them (pathways thinking). High levels of hope enable individuals to cope with difficulties, as challenges are perceived as obstacles to be overcome rather than barriers (Snyder, 2002). Among adults, higher levels of hope are associated with stronger coping abilities such as adapting to chronic illnesses and changing behavioral patterns to support a healthy lifestyle, as well as coping in times of crisis (Berg et al., 2011; Rasmussen et al., 2023). Although some researchers suggest that both components of hope (agency and pathways) begin to develop in infancy, a review of the literature indicates that most empirical studies have focused on children in elementary school (e.g., Ciarrochi et al., 2015; Dixon et al., 2016; Marques et al., 2017), but see Fraser et al. (2026). Among elementary school children, hope has been associated with adaptive behavior,

mental health, and self-esteem (Marques & Lopez, 2017). For example, Kaye-Tzadok and colleagues (2019) found that higher levels of hope among children in grades 2–6 moderated the negative association between insufficient material resources and psychological well-being.

Marques and Lopez (2017) argue that parents should intentionally foster hope in children from an early age. According to them, parents influence hope development through modeling and conversations about goals and ways to overcome challenges. Such interactions may help children develop both agency and pathways thinking. In the present study, we examine the relationship between characteristics of sustainability-related discourse during SBR and preschool children's hope—a topic that, to the best of our knowledge, has not yet been explored in the literature.

Hope and Sustainability

Ojala's work highlights hope's central role in sustainability education and environmental engagement. In a questionnaire study with Swedish adolescents and young adults, Ojala (2012) found that constructive hope—grounded in trust in individual and collective action was positively associated with pro-environmental behaviors. Extending this, Ojala (2017) argued that although many young people feel pessimistic or helpless about global environmental problems, hope is not merely a positive emotion but a crucial educational resource for sustainability. Drawing on Snyder's theory, she conceptualized hope as involving meaningful goals, realistic pathways to achieve them, and a sense of agency and efficacy. Accordingly, effective education should foster realistic, critical, and action-oriented forms of hope that help young people cope with climate-related concerns while supporting environmental engagement and motivation to act.

Regarding early childhood, Wolff and colleagues (2020) conducted a literature review examining the relationship between sustainability and hope and identified key elements of sustainability education. Their review suggests that children should be educated to become agents of change by fostering their ability to set goals and adopt behaviors that promote sustainable development. Supporting this view, Spiteri (2022) interviewed 11 children aged 3–7 about how to live sustainably. The children repeatedly emphasized the need to change habits and take action, such as recycling and reducing waste. These findings indicate that even young children understand that achieving an environmentally responsible lifestyle requires both setting goals and taking action.

The Present Study

In the present study, in the context of SBR of sustainability-themed books, we examined the relationship between parents' sustainability-related discourse during shared reading and preschool children's hope. The study had two main aims. Because the study is exploratory, the questions remained open:

1. How do parents mediate concepts of sustainability to their young children via reading books that address this topic?
 - a. We compared the characteristics of the discourse across two books, one that explicitly addresses sustainability, whereas the second addresses the topic implicitly
 - b. We also examined whether parents display a style of sustainability scaffolding that goes beyond the specific characteristics of the book.
2. What is the relationship between parental scaffolding of sustainability during SBR and children's hope?

METHOD

Participants

The sample included 57 parent–child dyads. The original sample included 60 dyads; however, analysis of the interactions indicated that three parents did not refer to sustainability during the reading sessions. We therefore excluded these dyads from the analyses.

Children's ages ranged from 50 months (4.1 years) to 82 months (6.1 years); the mean age was 67.46 months ($SD = 6.44$ months). The sample included 25 boys (43.9%) and 32 girls (56.1%). Regarding birth order, 21 children were firstborn (36.8%), 23 were secondborn (40.4%), nine were thirdborn (15.8%), and four were fourthborn or later (7.1%). All children attended preschools.

The participating parents included 52 mothers (91.2%) and five fathers (8.8%), aged 30 to 47 years ($M = 37.81$, $SD = 4.18$). Most parents were married ($n = 54$, 94.7%), two were divorced (3.5%), and one was a single mother (1.8%). The number of children per family ranged from one to six ($M = 2.81$, $SD = 1.03$). Most participating parents had an academic education: 25 held a bachelor's degree (43.9%), 25 held a master's degree (43.9%), and four held a doctoral degree (7.0%). Three parents had professional certification without an academic degree (e.g., video editing, beautician) (3.5%).

Materials and Measures

Books for Shared Reading

Two picture books were selected for the study:

1. *The Curious Garden* by Peter Brown (Hebrew edition published in 2011 by Matar). The story follows a curious boy who lives in a highly industrialized city with little vegetation. During one of his explorations of an abandoned railway station, he discovers dying plants and decides to become their gardener. Although he initially struggles, he gradually succeeds through repeated attempts and learning. The story then describes how the garden spreads throughout the city. By the end of the book, the city becomes green and flourishing, and many children join Liam in cultivating plants in the urban environment. The book contains 16 pages (see Figure 1).
2. *Florette* by Anna Walker (Hebrew edition published in 2018 by Keter). This story describes a girl who moves with her family to a large city and misses the garden she left behind. She attempts to recreate a garden through play and creative activities, but her attempts repeatedly fail. Everything changes when she discovers a neighborhood park and enthusiastically brings her family there. On her way, she follows a small bird to a closed flower shop called *Florette*. Under the shop door, she finds a small plant sprout, cares for it, and grows it in her new apartment. Other children later join her and help create a garden in the new place. The book contains 17 pages (see Figure 1).

Experts in children's literature from a children's literature center at an academic college selected the books in consultation [Yemima Center for Children's Literature at Beit Berl Academic College in Israel]. They were considered suitable for the study because they are relatively recent publications and feature child protagonists (a boy in one book and a girl in the other), enabling young readers to identify with the characters while maintaining some distance from their own lives. Both books address a range of emotions and invite discussion about coping with challenges. The illustrations and text complement each other and together encourage dialogue. The content and language level are appropriate for preschool children. To further ensure age appropriateness, nine preschool educators who are also mothers reviewed the books and confirmed they were suitable.



Figure 1. Pages from the books, *Florette* on the left and *The Curious Garden* on the right.

Coding of Shared Book Reading

All reading interactions were transcribed and analyzed using Atlas.ti, a qualitative data analysis software that facilitates the organization, coding, and analysis of textual data. The basic unit of analysis was the utterance, defined as a linguistically complete unit of speech (Golinkoff & Ames, 1979). The analysis focused specifically on parental scaffolding of sustainability; specifically, utterances referring to human actions toward nature or relationships between humans and nature were defined as sustainability-related utterances. We counted and summed the number of parents' sustainability-related utterances in each category across the readings:

1. Sustainability-related clarifications: Utterances referring directly to details in the text, including clarification of unfamiliar words (e.g., "Withering means they are about to die") or story events (e.g., "Liam couldn't take care of the plants because it was winter"), or comments closely tied to the illustrations or narrative (e.g., "Wow, look how beautiful the garden is").
2. Sustainability-related elaborations: Utterances extending beyond the "here and now" of the text. These included (a) thinking functions such as generalizations (e.g., "Spring, summer, autumn, and winter are the seasons of the year"); comparisons and inferences (e.g., "This is like the song that we sing about the flowers"); and (b) provision of additional world knowledge (e.g., "A place where the soil is fertile and plants can grow. That's called fertile land", "butterflies need flowers").
3. Sustainability-related scaffolding: Hints or prompts provided by the parent when the child was unable to answer a question (e.g., "What is this? [The child does not answer.] What do we call this action? Pru... [the mother provides the first sound] pruning"; "What do these plants need?" The child says, "water," and the mother continues, "yes, water and someone who..."; the child completes, "helps them.>").
4. Sustainability-related closed-ended questions: Yes–no questions related to environmental themes in the story (e.g., "Do you remember how it used to look when there were no plants everywhere?" referring to the transformation of the city from gray to green).
5. Sustainability-related open-ended questions: Questions encouraging extended responses rather than yes–no answers (e.g., "Who could come there without destroying it or stepping on it?").

Children's Hope

We assessed children's hope using an expanded, developmentally adapted version of the Children's Hope Scale (McDermott et al., 1997), originally designed for children aged 8–16. We expanded the questionnaire from 6 to 18 items and changed the scale from a 6-point to a 3-point scale (1 = never, 2 = sometimes, 3 = always). Half of the items related to agency thinking (i.e., the child's ability to set goals), and half assessed pathways thinking (i.e., the child's ability to generate strategies to achieve these goals and overcome obstacles). Examples of items for agency: "I think I can succeed"; "If I want to, I can play with other children"; "I will succeed in understanding what the teacher explains". Examples of items for pathways: "I can think of ways to achieve the things I want"; "I can find ways to play with a child I want to play with"; "When I do not understand what the teacher explained, I can find ways to understand it". Before administering the questionnaire, children completed a short practice task that included three sample statements (e.g., "I like playing in the sandbox") to ensure they understood the response format and task instructions.

In a pilot study with eight participants aged five to seven years ($M = 6.10$, $SD = 0.38$), the questionnaire's internal reliability was Cronbach's $\alpha = .88$. In the current study, reliability was Cronbach's $\alpha = .93$.

Children's Vocabulary

Based on extensive evidence indicating a positive association between characteristics of shared book reading and children's vocabulary (e.g., Murphy et al., 2023; Hindman et al., 2014), children's vocabulary was included as a control variable in analyses examining the associations between the sustainability-related discourse during shared reading and children's hope. Children's receptive vocabulary was assessed using the Peabody Picture Vocabulary Test (PPVT; Nevo & Oren, 1979). The examiner presented the child with four pictures and asked the child to identify the picture that matched a word spoken by the examiner. Each child was presented with 30 items (nouns and verbs),

adapted for children aged 5–6 years. Items included words such as eagle, locomotive, and freckles. For each word, the examiner instructed the child, “Show me, X.” Scores ranged from 0 to 30, with higher scores indicating a higher level of receptive vocabulary.

Procedure

The study received ethical approval from Tel Aviv University. Data were collected in the participants’ homes, and participants were recruited through social media announcements (Facebook and WhatsApp groups) and snowball sampling. Each parent read two books with their child in two sessions scheduled within one week of each other. The researcher video-recorded the interactions and ensured parents were unfamiliar with the books before participating. Parents received the books in advance and were asked to read each book to their child at least once before the recorded session. The researcher recorded the second reading because evidence suggests parents often read books multiple times, and the second reading tends to be richer (Schapira et al., 2021). The researcher counterbalanced the reading order across participants: half read *The Curious Garden* first and then *Florette*, while the other half read *Florette* first and then *The Curious Garden*. The researcher set up a tripod, positioned the camera toward the parent–child dyad, instructed participants to read the story and then talk about it as they normally would, and left the room during the interaction. Participants called the researcher back after finishing the reading and discussion. We assessed children’s vocabulary and hope individually in the family home (for half of the participants before the recorded interaction and for the other half afterward), without the parent present. We stored the dyadic interaction videos in accordance with the University’s ethical guidelines.

Data Analysis

To compare parents’ sustainability scaffolding across the two books, we performed a series of Negative Binomial Distribution (NBD) regressions predicting parents’ scaffolding by the book. We used NBD regressions because the count measures in the study had large standard deviations and followed a Poisson distribution (e.g., Hilbe, 2011). To learn about parental sustainability scaffolding style across the books, we conducted a correlational analysis. As the data were not normally distributed, we used Spearman’s rank correlations.

Lastly, we computed Pearson correlations to examine associations between parental sustainability scaffolding and children’s level of hope. Given the children’s wide age range (50 to 82 months) and the well-established association between parental scaffolding during shared book reading and children’s language (e.g., Zucker et al., 2013), we used partial correlations, controlling for children’s age and vocabulary level (PPVT).

RESULTS

Parents’ Scaffolding across the Two Books

We first describe parents’ sustainability scaffolding across the two books and the correlations between the books. Table 1 presents the descriptive statistics and Spearman correlations between the two books. Table 2 presents the NBD regressions comparing them.

As evidenced in Table 1, when reading the books about gardening, parents addressed the topic of sustainability, while the high standard deviations indicate variability among parents. During SBR, parents clarified facts from the books, elaborated on sustainability-related content, and asked questions about sustainability. In both books, clarification was the most common parental reference to sustainability. Parents tended to clarify facts in the books to ensure that their children understood the plot. During the shared book reading, they frequently asked questions. However, they rarely provided scaffolding during the interaction; that is, they rarely offered hints to their children when they struggled to answer sustainability-related questions.

Table 1*Parental Sustainability Scaffolding During SBR of the Two Books: Descriptive Statistics and Spearman Correlations*

Type of Utterance	Florette <i>M (SD)</i>	The Curious Garden <i>M (SD)</i>	<i>r</i>
Clarification	7.05 (6.53)	17.18 (14.30)	.67***
Elaborations: Thinking functions	2.82 (3.65)	4.39 (5.40)	.69***
Elaborations: World knowledge	0.49 (1.15)	1.42 (3.12)	.27***
Scaffolding	0.52 (1.00)	0.68 (1.15)	.33*
Closed-ended questions	3.49 (3.19)	5.67 (4.83)	.43***
Open-ended questions	3.72 (4.57)	6.56 (6.44)	.49***

Note. *N* = 57.**p* < .05, ****p* < .001.**Table 2***Negative Binomial Distribution (NBD) Results Examining Differences in Parental Sustainability Scaffolding Between the Two Books*

Type of Utterance	Florette <i>M (SE)</i>	The Curious Garden <i>M (SE)</i>	Wald χ^2	Exp(B)	<i>p</i>
Clarification	7.07 (.86)	17.18 (1.88)	58.95***	2.44	< .001
Elaborations: World knowledge	0.49 (.15)	1.42 (.41)	14.96***	2.89	< .001
Elaborations: Thinking functions	2.82 (.48)	4.39 (.71)	10.96***	1.55	< .001
Open questions	3.72 (.56)	6.56 (.85)	16.49***	1.76	< .001
Closed questions	3.49 (.42)	5.67 (.63)	12.79***	1.62	< .001
Scaffolding	0.52 (.13)	0.68 (.15)	0.90	1.30	.34

Note. *N* = 57.**p* < .05, ****p* < .001.

Table 2 shows that, across the measures (except for Scaffolding), parents engaged significantly more in sustainability-related scaffolding when reading *The Curious Garden*, which addresses sustainability directly and explicitly, than when reading *Florette*, which addresses sustainability more implicitly. That is, when sustainability was the book's explicit theme (*The Curious Garden*), parents engaged with it more frequently and mediated it more extensively to their children. They provided more clarification, asked more open-ended and closed-ended questions, and encouraged the child to think about sustainability. In contrast, in *Florette*, where sustainability is addressed more implicitly and the overt theme centers on a girl's longing for her former green environment before relocation, parents discussed sustainability to a lesser extent.

Studying the parents' sustainability scaffolding style, Table 1 shows significant correlations between parental scaffolding characteristics in one book and those in the other. These significant correlations across all measures indicate a characteristic parental scaffolding style regarding sustainability. That is, parents who frequently engaged in sustainability-related scaffolding when reading one book tended to do so when reading the other as well.

Associations Between Parental Sustainability Scaffolding and Children's Hope

The second aim of the study was to examine the associations between parental sustainability scaffolding style across the two books and children's level of hope. The children rated their ability to set goals (agency) and act toward achieving them (pathways) as moderate, tending toward high. On a three-point scale (1 = never, 2 = sometimes, 3 = always), children's hope scores ranged from 1.28 to 3 (*M* = 2.39, *SD* = 0.38).

Given the finding that parents use a consistent discourse style with their children, we created new variables by averaging each utterance type across the two books. We then examined the associations between each type of parental utterance and children's level of hope, controlling for children's age and vocabulary (see Table 3).

Table 3

Associations Between Parental Sustainability Scaffolding and Children's Hope, Controlling for Language Level and Age

Parental Utterance Type	Children's Hope
Clarification	.25*
Elaborations: World knowledge	.23*
Elaborations: Thinking functions	.06
Scaffolding	.21^
Closed questions	.25*
Open questions	.05

Note. $N = 57$

* $p < .05$, ^ $p = .058$.

Table 3 shows small but significant associations between the frequency of parental clarification, elaborations, provision of world knowledge, scaffolding, and closed-ended questions about sustainability and children's level of hope, controlling for child age and vocabulary. That is, higher levels of sustainability scaffolding during SBR of books that focused on children's gardening were associated with higher reported levels of children's hope.

DISCUSSION

The current study addressed two primary aims. First, it sought to characterize parents' sustainability-related scaffolding for their children during SBR of gardening-themed books and to determine whether a consistent parental scaffolding style could be identified. Second, it examined the associations between parental sustainability scaffolding during shared reading and children's level of hope. The findings indicated that parental sustainability scaffolding varied significantly with the book's thematic explicitness. When reading *The Curious Garden*, in which sustainability is presented explicitly, parents engaged more extensively with sustainability on all measures than when reading *Florette*, in which it is conveyed more implicitly. At the same time, the results suggested a stable parental scaffolding style, as reflected in consistent patterns of discourse across the books. Furthermore, parental sustainability-related discourse was associated with children's hope, even after accounting for differences in child age and vocabulary.

Characteristics of Parental Discourse on Sustainability Across Two Books

Research on sustainability education has largely focused on teachers' roles in introducing children to the environment (e.g., Edwards et al., 2011; Güler Yıldız et al., 2021; Lewis et al., 2010). A growing body of work highlights the importance of parental involvement in this process (e.g., Alam & Hamzah, 2025; Sihvonen et al., 2024). Parents are the ones who are closest to the child.

The study shows that parent-child SBR is a pathway of sustainable socialization. While long recognized as a tool for fostering language and literacy (e.g., Mol et al., 2009; Dowdall et al., 2020), SBR also offers opportunities to learn about our environment, as it frequently portrays everyday experiences and challenges, thereby inviting discussion of these issues. Also, SBR offers a calm setting that fosters attentive listening and meaningful parent-child dialogue, enabling links between stories and children's experiences.

Indeed, we found that books provide a valuable platform for discussing sustainability with children. The stories and accompanying illustrations prompted parents to engage their children in conversations about the topic. Parents provided their children with sustainability-related clarifications, sustainability-related elaborations in the form of

world knowledge, sustainability-related elaborations involving cognitive functions, and questions on sustainability. For example, one father explained: “This is called fertile land—a place where the soil is rich, and plants can grow. ‘Fertile’ means it has the conditions needed for growth.” A mother noted, “Everything is bright; there is sunlight. The sun helps plants a lot.” Parents also asked questions such as, “Why didn’t he expect to find plants there?” to which the child responded, “Because it is a very gray city.” In another instance, a mother asked, “What book does he read if he wants to become a gardener?” Additionally, a mother pointed to the illustration of the wind turbines and explained how they work.

These findings connect two complementary lines of research. Hsiao and Shih (2016) qualitatively demonstrated the potential of picture books as a pedagogical tool in preschool settings, showing that teachers' use of picture books led to significant improvements in children's understanding of the environment. At the same time, Borg et al. (2017) highlighted the importance of adult-child discussions, showing that parents' sustainability-related conversations are positively associated with children's declarative knowledge, although such discussions may occur less consistently at home than in educational settings. In educational settings, teachers tend to integrate sustainability more systematically into the curriculum, whereas at home, such discussions may occur less consistently. Taken together, our findings extend this literature by showing that shared book reading in the home may serve as a natural and accessible context for eliciting meaningful parent-child discussions about sustainability.

Comparing the Books

When comparing the books, we found that during the reading of *The Curious Garden*, parents provided their children with more sustainability-related clarifications and elaborations in the form of world-knowledge and cognitive-function elaborations, as well as open- and closed-ended questions on sustainability. These findings align with evidence that the characteristics of children's books shape the nature of parental scaffolding during SBR interactions (Aram et al., 2026; Bergman-Deitcher et al., 2021; Henkaline & Wagner, 2020). For instance, wordless picture books elicit richer discourse than texted books (Smadja et al., 2019), and informational books can promote broader and more in-depth discussions than narrative books (Bergman-Deitcher et al., 2019a). Even within the same genre, variations in book structure and content can shape reading styles (Bergman-Deitcher et al., 2019b). The *Curious Garden* clearly highlights sustainability through both words and pictures (see Figure 2), encouraging parents to discuss the topic with their children. The story begins with a dull, gray city devoid of plants, and later shows the main character—Liam—caring for plants—gardening, pruning, and watering—leading to the city's transformation into a vibrant, green space.

In contrast, while sustainability is present throughout *Florette*, it emerges indirectly through Mei's longing for her former garden. The story opens with Mei's wish to bring her garden with her, shown in her holding a single wilted flower. The narrative mainly elicits emotional talk about transition and loss, while sustainability themes—such as the value of nature and green spaces in urban settings—remain more implicit and layered (see Figure 3).



Figure 2. Illustrations in “*The Curious Garden*” that explicitly invite discussion of Liam's transformation, as the city shifts from an industrial environment to a green, flourishing one.

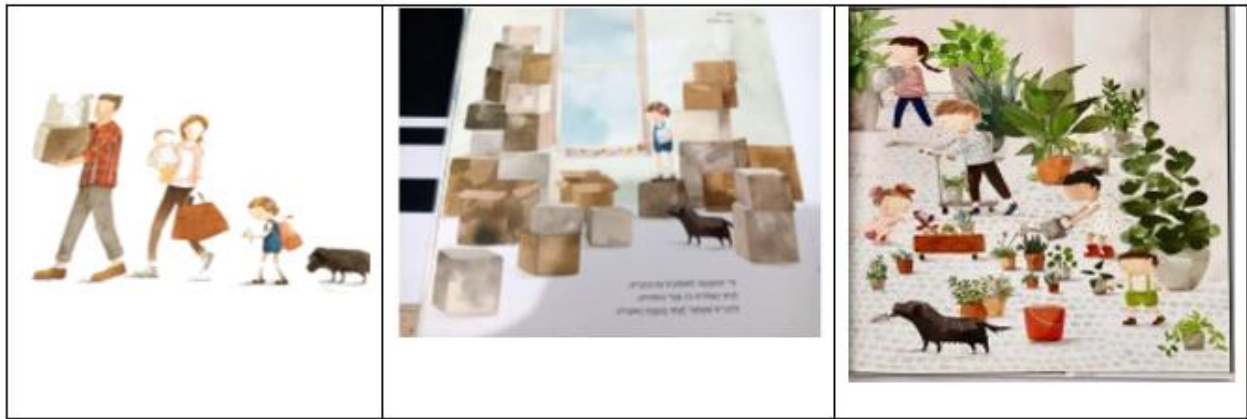


Figure 3. Illustrations from *Florette* that implicitly invite discussion on her love of nature (conveyed through the “treasures” on the windowsill), and scenes of planting and watering sprouts.

Encouraging parent–child discussion on a specific topic appears to depend on how explicitly the topic is presented and conveyed through both text and illustrations. Consistent with this, Park and Ostrosky (2014) selected books that explicitly addressed disabilities and inclusion to create a context that would guide parental discourse on the topic. Similarly, in the present study, the book's most salient features seemed to prompt parents to focus on its central theme.

Parental Scaffolding Style

Parents who frequently mediated sustainability while reading *The Curious Garden* tended to do so as well when reading *Florette*. This pattern suggests that, beyond the influence of book characteristics, parents exhibit a relatively stable scaffolding style. This interpretation is consistent with prior research comparing parental scaffolding across different reading contexts. Although scaffolding levels may vary with book features, associations among scaffolding indices point to underlying consistency in how parents engage with their children during SBR (e.g., Price et al., 2009). Thus, parental scaffolding appears to reflect not only responsiveness to textual affordances but also a stable, individual interaction style.

A possible explanation for this consistency lies in parents' beliefs about the purposes of reading with children. Meagher et al. (2008) found that mothers who viewed reading as a learning opportunity provided richer, more cognitively oriented scaffolding. In the present study, parents may have approached both books with a similar instructional orientation, using the reading context to support their children's understanding of sustainability.

Evidence from other domains of parent–child interaction further supports the notion of stable parental styles (Metsäpelto et al., 2001). Studies of parent–child writing interactions in early childhood have documented consistent scaffolding patterns across different tasks (e.g., Aram & Chorowicz Bar-Am, 2016). Taken together, these findings highlight the interplay between contextual properties and stable parental tendencies. While a book's explicitness and structure shape the content and focus of parent–child discourse, parents bring their own scaffolding style to the interaction, which guides how they interpret and elaborate on the text.

Parental Sustainability Scaffolding and Children's Hope

We found small yet statistically significant associations between parental sustainability scaffolding during SBR and children's level of hope beyond their age and vocabulary. That is, parents who engaged more extensively in sustainability-related discourse tended to have children with higher levels of hope. In the context of sustainability, achieving sustainability goals involves the core components of hope: agency—setting goals toward a sustainable lifestyle—and pathways—identifying the routes and behavioral changes required to achieve these goals (Snyder,

2002). Both books show how children initiate change in their environments. Liam, the protagonist of *The Curious Garden*, initiates an environmental transformation in his city, turning it from a highly industrialized city into a green, flourishing one. Mae, the protagonist of *Florette*, adapts to a new living environment following relocation and creates a garden. Thus, the protagonists in both books must identify ways to act to achieve their goals. Both characters thus demonstrate high levels of hope.

Hope can be learned and fostered (e.g., Grund & Brock, 2019; Westburg & Martin, 2003). Parental scaffolding on sustainability may therefore also function as a form of hope scaffolding. The associations found between parental sustainability scaffolding and children's level of hope highlight the potential power of such scaffolding. These findings are consistent with research in sustainability education, which calls for teaching children to take action (pathways thinking) and for explicitly fostering components of hope—goal setting and identifying routes to achieve them—within sustainability education (e.g., Grund & Brock, 2019; Spiteri, 2022; Wolff et al., 2020).

Limitations and Directions for Future Research

To the best of our knowledge, our study is a pioneering examination of how parents address sustainability during SBR and of the association between parental sustainability scaffolding and preschool children's level of hope. Several limitations should be acknowledged: First, the sample size was relatively small (57 parent–child dyads). A larger sample might yield more robust and precise findings. Second, the range of parental education in the sample was limited, with most participants holding academic degrees. Future research should examine whether the observed associations hold across populations with more diverse socio-economic backgrounds. Third, the present study is correlational. Intervention studies that use books to promote sustainability-related discourse are needed to establish causal relationships between adults' scaffolding and children's hope. Such interventions could clarify the extent to which engaging in sustainability-related discussions during SBR fosters children's hope. Given that sustainability is also addressed within early childhood education systems (e.g., Melis et al. 2026), future research should examine both parental and educational discourse with preschool children during storybook reading and investigate how targeted interventions can enhance sustainability discourse, hope, and additional social-emotional outcomes.

Educational Implications

Despite its limitations, the study provides important insights into the nature of sustainability-related discourse during SBR and highlights an association between parental sustainability scaffolding and children's hope. We suggest integrating sustainability education into programs that foster social-emotional competencies, such as life skills curricula. In particular, we recommend incorporating books that address sustainability and emphasize humans' capacity to take action and influence reality. Parents and educators are encouraged to engage children in discussions about sustainability and about children's own ability to initiate change in their surroundings.

Sustainability encompasses a broad range of topics, including environmental protection, mutual responsibility, care for public spaces, and social responsibility. Children's literature richly reflects these themes, making it a valuable context for promoting sustainability-related discourse. Such activities may help parents and preschool teachers engage children in meaningful conversations, deepen their understanding of the world, and foster both their sense of hope and their perceived capacity to help make the world a better place.

References

- Alam, S., & Hamzah, R. A. (2025). The role of parental involvement in promoting education for sustainability in primary schools. *Asian Education and Development Studies*, 14(3), 563–578.
- Aram, D., Avman Wolff, I., Aviram-Brill, S., Roth-Barkai, Y., & Zaidman Zait, A. (2026). The Character Matters: Exploring Adult-Child Discourse in Shared Reading of Books with Animal vs. Human Protagonists. In R. Schapira & D. Aram (Eds.), *Shared Book Reading and Children's Social-Emotional Competence*. Chap. 3. Pp. 27–40.

- Aram, D., & Chorowicz Bar-Am, O. (2016). Parent-kindergartner joint writing: A comparison between computer use and pencil and paper. *International Journal of Child-Computer Interaction*, 7, 15–21. doi:10.1016/j.ijcci.2016.03.001
- Berg, C. J., Ritschel, L. A., Swan, D. W., An, L. C., & Ahluwalia, J. S. (2011). The role of hope in engaging in healthy behaviors among college students. *American Journal of Health Behavior*, 35(4), 402–415. <https://doi.org/10.5993/AJHB.35.4.3>
- Bergman Deitcher, D. B., & Johnson, H. (2022). Parents and children reading together: Expanding shared book-reading across genres. *Journal of International Education and Practice*, | 5(01). <https://doi.org/10.30564/jiep.v5i1.4493>
- Bergman Deitcher, D., Johnson, H., & Aram, D. (2019a). Does book genre matter? Boys' and girls' word learning from narrative and informational books in the preschool years. *Journal of Research in Reading*, 42(3), 193–211. DOI:10.1111/1467-9817.12266.
- Bergman-Deitcher, D., Aram, D., & Goldberg, A. (2019b). Alphabet books: The nature of parents' shared reading between and across books. *Journal of Early Childhood Literacy*, 42(1), 193–211. <https://doi.org/10.1177%2F1468798418814103>
- Borg, F., Winberg, M., & Vinterek, M. (2017). *Children's learning for a sustainable society: Influences from home and preschool*. *Education Inquiry*, 8(2), 151–172. <https://doi.org/10.1080/20004508.2017.1290915>
- Brekke Stangeland, E., Campbell, J., Kucirkova, N., & Hoel, T. (2024). Shared book reading: a Norwegian survey of reading practices in families, *Scandinavian Journal of Educational Research*, 68:6, 1304–1319. DOI:10.1080/00313831.2023.2229369
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design* (1st ed.). Harvard University Press. <https://doi.org/10.4159/9780674028845>
- Brown, P. (2009). *The curious garden*. Little, Brown Books for Young Readers.
- Chen, H., Lyu, D., & Zhu, L. (2025). The effectiveness of social-themed picture book reading in promoting children's prosocial behavior. *Frontiers in Psychology*, 16, 1569925. <https://doi.org/10.3389/fpsyg.2025.1569925>
- Chou, Y. J., Hu, B. Y., & Roberts, S. K. (2021). Features of Taiwanese parents' moral discourse in shared storybook reading: Exploring associations related to preschoolers' cognitive and affective moral attribution. *Early Childhood Education Journal*, 49(6), 1007–1019. <https://doi.org/10.1007/s10643-020-01110-z>
- Ciarrochi, J., Parker, P., Kashdan, T. B., Heaven, P. C. L., & Barkus, E. (2015). Hope and emotional well-being: A six-year study to distinguish antecedents, correlates, and consequences. *The Journal of Positive Psychology*, 10(6), 520–532. <https://doi.org/10.1080/17439760.2015.1015154>
- Davis, J. M. (2023). *Young children and the environment: Early education for sustainability* (4th ed.). Cambridge University Press.
- Dixson, D. D., Worrell, F. C., Olszewski-Kubilius, P., & Subotnik, R. F. (2016). Beyond perceived ability: the contribution of psychosocial factors to academic performance. *Annals of the New York Academy of Sciences*, 1377(1), 67–77. <https://doi.org/10.1111/nyas.13210>
- Dowdall, N., Melendez-Torres, G. J., Murray, L., Gardner, F., Hartford, L., & Cooper, P. J. (2020). Shared picture book reading interventions for child language development: A systematic review and meta-analysis. *Child Development*, 91(2), e383-e399. DOI: 10.1111/cdev.13225
- Edwards, S., & Cutter-Mackenzie, A. (2011). Environmentalising early childhood education curriculum through pedagogies of play. *Australasian Journal of Early Childhood*, 36(1), 51–59. <https://doi.org/10.1177/183693911103600109>
- Fraser, A., Calley, A., Wang, W., Bryce, C., & Kennington, K. (2026). Hope in Early Childhood: Novel Methodology for Measuring Hope in 5-and 6-Year-Olds. *Wiley Interdisciplinary Reviews: Cognitive Science*, 17(2), e70024. <https://doi.org/10.1002/wcs.70024>
- Furu, A.C., Chan, A., Larsson, J., Engdahl, I., Klaus, S., Navarrete, A. M., & Turk Niskač, B. (2023). Promoting resilience in early childhood education and care to prepare children for a world of change: A critical analysis of national and international policy documents. *Children*, 10(4), 716. <https://doi.org/10.3390/children10040716>
- Galea, C., Jones, A., Ko, K., Salins, A., Robidoux, S., Noble, C., & McArthur, G. (2025). Home-based shared book reading and developmental outcomes in young children: A systematic review with meta-analyses. *Frontiers in Language Sciences*, 4, 1540562. <https://doi.org/10.3389/flang.2025.1540562>

- Golinkoff, R. M., & Ames, G. J. (1979). A comparison of fathers' and mothers' speech with their young children. *Child Development*, 50(1), 28–32. <https://doi.org/10.2307/1129037>
- Güler Yıldız, T., Öztürk, N., İlhan İyi, T., Aşkar, N., Banko Bal, Ç., Karabekmez, S., & Höl, Ş. (2021). Education for sustainability in early childhood education: A systematic review. *Environmental Education Research*, 27(6), 796–820. <https://doi.org/10.1080/13504622.2021.1896680>
- Hsiao, C.-Y., & Shih, P.-Y. (2016). Exploring the effectiveness of picture books for teaching young children the concepts of environmental protection. *International Research in Geographical and Environmental Education*, 25(1), 36–49. <https://doi.org/10.1080/10382046.2015.1106203>
- Hedefalk, M., Almqvist, J., & Östman, L. (2015). Education for sustainable development in early childhood education: A review of the research literature. *Environmental Education Research*, 21(7), 975–990. <https://doi.org/10.1080/13504622.2014.971716>
- Henkaline, K., & Wagner, L. (2020). The influence of book subgenre on parent-child reading interactions. *Cognitive Development*, 55, 100907. <https://doi.org/10.1016/j.cogdev.2020.100907>
- Hilbe, J. M. (2011). *Negative binomial regression* (2nd ed.). Cambridge University Press.
- Inoue, T., Georgiou, G. K., Parrila, R., & Kirby, J. R. (2018). Examining an extended home literacy model: The mediating roles of emergent literacy skills and reading fluency. *Scientific Studies of Reading*, 22(4), 273–288. <https://doi.org/10.1080/10888438.2018.1435663>
- Hindman, A.H., Skibbe, L.E., & Foster, T.D. (2014). Exploring the variety of parental talk during shared book reading and its contributions to preschool language and literacy: evidence from the Early Childhood Longitudinal Study-Birth Cohort. *Reading and Writing: An Interdisciplinary Journal* 27, 287–313. <https://doi.org/10.1007/s11145-013-9445-4>
- Kaye-Tzadok, A., Ben-Arieh, A., & Kosher, H. (2019). Hope, material resources, and subjective well-being of 8- to 12-year-old children in Israel. *Child Development*, 90(2), 344–358. <https://doi.org/10.1111/cdev.13130>
- Korat, O., Segal-Drori, O., & Spielberg, L. (2018). Word explanation and content expansion during storybook reading: Relation to SES and children's language. *Early Child Development and Care*, 188 (6), 691–708. <https://doi.org/10.1080/03004430.2016.1230107>
- Lewis, E., Mansfield, C., & Baudains, C. (2010). Going on a turtle egg hunt and other adventures: Education for sustainability in early childhood. *Australasian Journal of Early Childhood*, 35(4), 95–100. <https://doi.org/10.1177/183693911003500412>
- Marques, S. C., Gallagher, M. W., & López, S. J. (2017). Hope- and academic-related outcomes. A meta-analysis. *School Mental Health*, 9, 250–262. <https://doi.org/10.1007/s12310-017-9212-9>
- Marques, S. C., & López, S. J. (2017). Promoting hope in children. In M. W. Gallagher & S. J. Lopez (Eds.), *The Oxford handbook of hope* (pp. 117–132). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199399314.013.10>
- McDermott, D., Hastings, S.L., Gariglietti, K.P., & Callahan, B. (1997). *The development of the Young Children's Hope Scale*. Unpublished manuscript, University of Kansas, Lawrence.
- Melis, C., Borg, F., & Falcichio, G. (2026). Sustainability in early childhood education: a comparison among national curricula in Italy, Norway and Sweden. *Environmental Education Research*, 32(1), 47–68. DOI: 10.1080/13504622.2025.2505954
- Metsäpelto, R. L., Pulkkinen, L., & Poikkeus, A. M. (2001). A search for parenting style: A cross-situational analysis of parental behavior. *Genetic, Social, and General Psychology Monographs*, 127(2), 169–192.
- Meagher, S. M., Arnold, D. H., Doctoroff, G. L., & Baker, C. N. (2008). The relationship between maternal beliefs and behavior during shared reading. *Early Education and Development*, 19(1), 138–160. <https://doi.org/10.1080/10409280701839221>
- Mol, S. E., Bus, A. G., & de Jong, M. T. (2009). Interactive book reading in early education: A tool to stimulate print knowledge as well as oral language. *Review of Educational Research*, 79(2), 979–1007. <https://doi.org/10.3102/0034654309332561>
- Nevo, B., & Oren, A. (1979). *Hebrew version of the Peabody Picture Vocabulary Test*. University of Haifa Press. (Hebrew).
- Olof, F., & Osbeck, C. (2018). Challenging the concept of ethical literacy within Education for Sustainable Development (ESD): Storytelling as a method within sustainability didactics, *Education 3-13*, 46(2), 133–142. <https://doi.org/10.1080/03004279.2016.1201690>

- Park, H., & Ostrosky, M. M. (2014). What typically developing children's parents say when they read books about disabilities. *Topics in Early Childhood Special Education*, 33(4), 225–236.
<https://doi.org/10.1177/0271121413497104>
- Price, L. H., Van Kleeck, A., & Huberty, C. J. (2009). Talk during book sharing between parents and preschool children: A comparison between storybook and expository book conditions. *Reading Research Quarterly*, 44(2), 171–194. <https://doi.org/10.1598/RRQ.44.2.4>
- Rasmussen, H. N., England, E., & Cole, B. P. (2023). Hope and physical health. *Current Opinion in Psychology*, 49, 101549. <https://doi.org/10.1016/j.copsyc.2022.101549>
- Samuelsson, I. P., & Kaga, Y. (2008). The contribution of early childhood education to a sustainable society. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000159355.pdf>
- Schapira, R., & Aram, D. (2026). Shared Book Reading and Children's Social-Emotional Competence. Springer.
- Schapira, R., & Aram, D. (2020). Shared book reading at home and preschoolers' socio-emotional competence. *Early Education and Development*, 31:6, 819–837. DOI: 10.1080/10409289.2019.1692624.
- Schapira, R., Bergman Deitcher, D., & Aram, D. (2021). Variability and stability in parent–child discourse during and following repeated shared book reading. *Reading and Writing*, 34(1), 273–300. <https://doi.org/10.1007/s11145-020-10072-y>
- Scoffham, S., & Rawlinson, S. (2022). Teaching about sustainability. In *Sustainability education: A classroom guide* (pp. 53–66). Bloomsbury Publishing Plc. <https://doi.org/10.5040/9781350262119.ch-004>.
- Sihadi, D. W., Sofia, H., Yuliani, N., & Agus, S. (2017). The effects of green schooling knowledge level and intensity of parental guidance on the environmental awareness of early-age students. *Educational Research and Reviews*, 12(5), 251–257. <https://doi.org/10.5897/ERR2015.2608>
- Sihvonen, P., Lappalainen, R., Herranen, J., & Aksela, M. (2024). Promoting sustainability together with parents in early childhood education. *Education Sciences*, 14(5), 541. <https://doi.org/10.3390/educsci14050541>
- Smadja, M. L., Aram, D., & Ziv, M. (2019). The impact of variations in text presence in children's storybooks on preschool teachers' discourse. *Journal of Research in Childhood Education*, 33(2), 194–211.
<https://doi.org/10.1080/02568543.2019.1577774>
- Snyder, C. R. (2002). Hope theory: Rainbows in the mind. *Psychological Inquiry*, 13(4), 249–275.
- Spiteri, J. (2022). How can environmental sustainability be achieved? The perceptions of young children as expressed through their drawings. *International Journal of Early Childhood*, 54(1), 13–31.
<https://doi.org/10.1007/s13158-021-00312-9>
- UNESCO. (2017). Education for sustainable development goals: Learning objectives. UNESCO.
<https://www.unesco.org/en/articles/education-sustainable-development-goals-learning-objectives>
- UNESCO. (2020). *Education for sustainable development: A roadmap*. UNESCO Publishing.
<https://unesdoc.unesco.org/ark:/48223/pf0000374802>.
- UNESCO. (2024). *Greening curriculum guidance: Teaching and learning for climate action*. UNESCO.
<https://doi.org/10.54675/AOOZ1758>
- Vogt, M., & Weber, C. (2019). Current challenges to the concept of sustainability. *Global Sustainability*, 2, Article e4. <https://doi.org/10.1017/sus.2019.1>
- Walker, A. (2017). *Florette*. Clarion Books.
- Winsler, A. (2003). Introduction to special issue: Vygotskian perspectives in early childhood education: Translating ideas into classroom practice. *Early Education and Development*, 14(3), 253–270.
https://doi.org/10.1207/s15566935eed1403_1
- Wirth, A., Ehlig, S. C., & Niklas, F. (2022). The role of the home literacy environment for children's linguistic and socioemotional competencies development in the early years. *Social Development*, 31 (2), 372–387. <https://doi.org/10.1111/sode.12550>
- Wolff, L.-A., Skarstein, T. H., & Skarstein, F. (2020). The mission of early childhood education in the Anthropocene. *Education Sciences*, 10(2), 27.
<https://doi.org/10.3390/educsci10020027>
- World Commission on Environment and Development. (1987). Our Common Future. Oxford University Press. chrome-extension://efaidnbmnnnibpcjpcglclefindmkaj/http://www.un-documents.net/our-common-future.pdf

Zucker, T. A., Cabell, S. Q., Justice, L. M., Pentimonti, J. M., & Kaderavek, J. N. (2013). The role of frequent, interactive prekindergarten shared reading in the longitudinal development of language and literacy skills. *Developmental Psychology*, 49(8), 1425–1439. <https://doi.org/10.1037/a0030347>

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Exploring Early Nature Connectedness: A Descriptive Study with Icelandic Preschool Children

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ABSTRACT

Nature connectedness - a person's psychological relationship with the natural world - has been associated with well-being, environmental attitudes, and pro-environmental behavior. Although interest in nature connectedness has grown in recent years, relatively little research has examined how young children themselves describe and experience relationships with nature. This qualitative study explores early nature connectedness among Icelandic preschool children using draw-and-tell interviews. Guided by a tripartite conceptualization of nature connectedness encompassing emotional, cognitive, and behavioral domains, we analyze children's drawings and narratives to examine how they conceptualize nature, express feelings toward it, and describe their interactions with natural environments. Findings suggest that young children describe nature connectedness through relational, sensory, and imaginative experiences that are often grounded in familiar places and everyday activities. The study highlights the role of sociocultural and ecological context in shaping children's understandings of nature and demonstrates the value of child-centered qualitative approaches for advancing research on early nature connectedness.

Keywords: early nature connectedness; preschool children; environmental education; child-nature relationships; draw-and-tell interviews; Iceland

Across the globe, researchers and educators are increasingly concerned with how children develop meaningful relationships with the natural world (Arola et al., 2023; Beery et al., 2020; Choe & Sheffield, 2024; Mohamed et al., 2022). As environmental challenges intensify, fostering care for nature and sustainable ways of living has become an urgent educational and societal priority (Barragan-Jason et al., 2023; Whitburn et al., 2020). Many scholars argue that experiences in early childhood play an important role in shaping how individuals understand, value, and interact with the natural environment across the lifespan (Barrable, 2019b; Chawla, 2020; Wells & Lekies, 2006).

One concept that has gained growing attention in this work is nature connectedness (NC), or the psychological relationship individuals feel with the natural world (Richardson et al., 2020). In adults, NC has been positively associated with both environmental stewardship and pro-environmental behavior (Guazzini et al., 2025; Mackay &

Schmitt, 2019) and with individual health and well-being (Barragan-Jason et al., 2023; Martin et al., 2020). Conversely, lower levels of NC has been associated with feelings of fear, aversion, discomfort, or indifference toward nature (Beery et al., 2023; Olivos-Jara et al., 2020), which may contribute to disengagement from environmental issues or harmful environmental behaviors (Green et al., 2016). However, most research on NC has focused on adults or older children, leaving open important questions about how these relationships begin to form in early childhood.

Understanding early nature connectedness (ENC) - which we conceptualize as nature connectedness in children less than 6 years - is challenging because young children experience and express their relationships with nature in ways that may differ substantially from adults (Arola et al., 2023; Barrable, 2019b; Beery et al., 2020). For example, young children often convey their experiences through play, imagination, and sensory engagement rather than abstract reasoning (Beery & Jørgensen, 2018; Berger, 2021). Yet relatively little research has explored how young children themselves describe their experiences with nature. The present study addresses this gap by examining how Icelandic preschool children articulate their relationships with nature through draw-and-tell interviews. By centering children's own perspectives, this study contributes to a growing body of research seeking to better understand how ENC develops in young children (e.g., Barrable, 2019a; Beery et al., 2020; Giusti et al., 2018).

Conceptual Foundations of Early Nature Connectedness

In the present study, we use nature connectedness as an umbrella term to refer to a person's psychological relationship with the natural world, including a person's thoughts about, and feelings toward, nature (Richardson et al., 2020). A number of related constructs have been used to describe people's relationships with nature including emotional affinity toward nature (Kals et al., 1999), inclusion of nature in the self (Schultz, 2001), environmental identity (Clayton, 2003), and nature relatedness (Nisbet et al., 2009). Empirical work by Tam (2013), however, found that these constructs converge onto a common latent factor. Following Barrable and Booth (2020a), we use the term nature connectedness as an umbrella construct to capture this broader psychological relationship with the natural world, and we use early nature connectedness (ENC) to describe this psychological experience for children under 6 years. Empirical research also suggests that environmental knowledge and nature connectedness show only modest overlap (Otto & Pensini, 2017; Roczen et al., 2014), reinforcing the importance of distinguishing children's developing interpretations of nature from broader forms of environmental knowledge or competence.

A Tripartite Framework of Early Nature Connectedness

While nature connectedness in adults has been conceptualized through multiple related constructs and measurement scales, the conceptual boundaries of ENC are still being defined. Studies involving older children often measure nature connectedness using adapted versions of adult instruments, such as the Connection to Nature Index (Cheng & Monroe, 2012). Other research with young children has relied on parent reports (e.g., Sobko et al., 2018) or operationalized children's relationships with nature in specific ways, such as biophilia (Rice & Torquati, 2013) or affinity with the biosphere (Giusti et al., 2014).

In the present study, we conceptualize ENC as an emerging psychological relationship with the natural world that is expressed through how children feel, think, and act in relation to nature. We utilize a tripartite framework of ENC encompassing three interrelated domains: emotional, cognitive, and behavioral. In previous quantitative work (Orman et al., 2025), this tripartite framework was operationalized using measures of enjoyment of nature, empathy for nature, and pro-environmental behavior. In the present study, we instead examine how these dimensions are expressed descriptively through children's narratives and drawings. Emotionally, children may express feelings such as joy, calm, curiosity, or fear in relation to natural elements and environments (e.g., Beery et al., 2020; Soga et al., 2020). Cognitively, children begin forming working theories about nature, developing ideas about its components, affordances, meanings, and relational processes (e.g., Giusti et al., 2014; Zhai & Gao, 2024). Behaviorally, children may engage in caregiving activities or pro-environmental behaviors with nature (e.g., Barrable & Booth, 2020a; Kos et al., 2016).

Importantly, we do not consider these domains to be discrete stages or static traits. Rather, they represent overlapping and co-occurring expressions of a child's developing ENC. For example, a child who names a tree, hugs

it, and later tells a story about it may be engaging emotionally, cognitively, and behaviorally in relation to the same experience. Further, we distinguish ENC - a psychological experience - from physical contact with nature (i.e., time spent in natural environments). Although direct experiences in nature can create opportunities for ENC to develop, physical exposure alone does not necessarily lead to a sense of connectedness (Barragan-Jason et al., 2023; Richardson et al., 2019). In early childhood, interactive experiences with nature may therefore serve as contexts through which children's emerging ENC becomes visible (Chawla, 2015).

Our previous work (Orman et al., 2025) operationalized this tripartite framework of ENC through structured measures of enjoyment of nature (EON), empathy for nature (EFN), and pro-environmental behavior (PEB). The present study builds on that foundation but shifts toward a descriptive, child-centered approach using draw-and-tell interviews to capture how young children themselves articulate their experiences with nature.

Sociocultural and Biosystem Influences on Early Nature Connectedness

Culture shapes the neurological processes by which humans take in and interpret sensory data from their environment (Miyamoto et al., 2006), making "nature" itself a social construction (Greider & Garkovich, 2010). Culture also interacts with ecological contexts to shape how humans perceive and interpret the natural environment (Kaplan & Herbert, 1987; Milfont & Schultz, 2016; Wang et al., 2021). Thus, sociocultural and ecological influences are not simply external moderators or confounders of nature connectedness; rather, they are constitutive of how individuals experience and interpret nature (Giusti et al., 2018; Milfont & Schultz, 2016).

Relatedly, culture is not layered onto development but rather embedded within children's cognitive and emotional processes (Heft, 2013; Immordino-Yang & Damasio, 2007). Children's relationships with nature are shaped not only by individual preferences or developmental stage, but also by the cultural, relational, and ecological contexts in which they live (Chawla, 2021; Orman et al., 2025; Passmore et al., 2020). This aligns with ecological systems theory (Bronfenbrenner & Morris, 2005), which emphasizes that children's developing relationships with nature are embedded within their everyday environments, including homes, schools, neighborhoods, and broader cultural narratives about nature (Beery et al., 2020; Chawla, 2020; Elliott & Davis, 2020). For example, a child's sense of wonder at a thunderstorm, fear of an insect, or affection for a tree is shaped by meanings conveyed through family interactions, media, schooling, and cultural practices.

The ecological characteristics of a child's local environment also shape how nature is defined and experienced (Fraijo-Sing et al., 2020; Profice, 2018). In this study, we use the term "local biosystem" to refer to the sensory and ecological features of a child's surroundings that shape their experiences with nature (Elliott & Davis, 2020). These may include specific organisms, landscapes, weather patterns, or environmental textures. For example, in Iceland, children may encounter coastal environments, volcanic landscapes, wind, and moss-covered terrain as everyday elements of "nature." These local ecological conditions become embedded in children's emotional and cognitive maps of nature, shaping how they experience and describe the natural world (Kellert, 2002; Procter, 2015). In the present study, these local biosystem influences are examined through children's expressions of *ecological situatedness*, reflected in references to nearby organisms, environmental features, and familiar outdoor settings embedded within their everyday routines.

Developmental Expression of Nature Connectedness in Early Childhood

In addition to these domains and contextual influences, young children may express their relationships with nature through developmentally characteristic modes of thinking and communication. Early childhood is marked by imaginative engagement with the world, including the attribution of human-like qualities to animals, plants, and other natural elements (Herrmann et al., 2010; Severson & Woodard, 2018). Such anthropomorphic or imaginative representations can reflect children's emerging relational thinking, empathy, and meaning-making about the natural world (Beery et al., 2020; Geerdt, 2016). In this study, we attended to imaginative and anthropomorphic expressions as one way that children's emotional, cognitive, and behavioral connectedness to nature may become visible.

Why Studying Early Nature Connectedness Matters

A growing body of research suggests that NC in childhood is associated with a range of positive outcomes, including psychological well-being, environmental attitudes, and pro-environmental behaviors (Arola et al., 2023; Cheng & Monroe, 2012; Harris et al., 2025; Tillmann et al., 2018). In early childhood, these relationships may be particularly significant, as this developmental period is foundational for self-understanding, emotional regulation, and social learning (Annu & Singh, 2021; Barrable, 2019b; Berger, 2021). That is, the relationships young children form with the natural world may develop alongside an understanding of who they are in the world, as they are increasingly able to regulate emotions towards specific aims, and as they develop social skills like empathy and theory of mind (Annu & Singh, 2021; Barrable, 2019b).

In older children and adults, NC has been associated with positive affect, reduced stress, and greater life satisfaction (Arola et al., 2023; Capaldi et al., 2014; Chawla, 2020). These benefits are related not only to time spent outdoors but also to the quality of the individual's psychological relationships with nature. This is important: time in nature is not the same as, nor does it produce the same benefits as, the quality of an individual's psychological relationship with nature (Barragan-Jason et al., 2023; Martin et al., 2020). Thus, it is important to understand and examine ENC in young children, not just how much time they spend in nature.

Further, research suggests that nurturing ENC in childhood may influence environmental concern and/or behaviors later in life (Barrable et al., 2024; Chawla, 2020; Wells & Lekies, 2006). In older children and adults, NC has been associated with pro-environmental behaviors both concurrently and over time (Cheng & Monroe, 2012; Uram et al., 2025). For example, recent work by Yan and colleagues (2025) found that early experiences in nature were not directly associated with pro-environmental behavior in adulthood, but were indirectly related through feelings for nature, a core feature of NC. Similarly, Shakari et al. (2024) found that associations between early nature experiences and adult pro-environmental behavior were mediated by NC. Longitudinal research in this area remains limited, however, and further work is needed. Clarifying the conceptual boundaries of ENC may help support more rigorous longitudinal studies examining whether and how early ENC contributes to later pro-environmental behavior, an important question in the context of climate change.

Why Iceland

Iceland provides a compelling context in which to explore ENC. In Iceland, over 96% of children aged three to five attend publicly funded preschools (OECD, 2021). Iceland, like other Nordic nations, espouses access to nature in early childhood for the purpose of advancing child health and well-being and cultivating sustainable attitudes amongst children (Norðdahl & Jóhannesson, 2015). Forming a relationship with nature is considered part of a "good childhood" in Nordic nations (Bergnéhr, 2009) and therefore sustainability (including respect for nature) is one of the core pillars in Icelandic's national preschool curriculum (Ministry of Education, Science, and Culture, 2011). Further, nature is not viewed as separate from daily life but as a familiar and valued presence woven into family routines, educational practices, and cultural narratives (Norðdahl & Jóhannesson, 2015). Thus, rather than examining ENC in a context where nature access may be limited or contested, this study explores how young children describe their experiences with nature in a setting where interaction with natural environments is widely standardized. These conditions create opportunities for young children to engage regularly with natural environments, making Iceland a revealing case (Flyvbjerg, 2006) for exploring how ENC may be expressed under conditions of high nature access and social encouragement.

Purpose and Research Questions

Despite growing interest in ENC, relatively little research has examined how young children themselves describe their relationships with nature. Much existing research relies on adult-derived constructs or retrospective self-reports, limiting our understanding of how ENC is expressed in young children.

To address this gap, the present study adopts a child-centered qualitative approach using draw-and-tell interviews with Icelandic preschool children. Guided by a tripartite conceptualization of ENC encompassing emotional,

cognitive, and behavioral domains - and shaped by sociocultural and biosystemic contexts - this study explores how young children describe their relationships with nature.

The study addresses the following research questions:

1. Emotional domain: How do young children express feelings about and toward nature?
2. Cognitive domain: How do young children describe and interpret nature and their relationship to it?
3. Behavioral domain: How do young children describe actions related to caring for nature?
4. Contextual domain: How are children's everyday ecological and social environments reflected in their relationships with nature?

Methods

Participants

This study was embedded within a larger quantitative investigation of early nature connectedness among Icelandic preschool children (Orman et al., 2025). Participants for the larger study were recruited from four preschools in southwest Iceland (the capital region and Reykjanes peninsula) and one preschool in northern Iceland. The four schools in southwest Iceland were selected based on their previous participation in a national professional development course led by one of the authors and therefore constituted a convenience sample. Although the course focused on science, technology, and literacy within the preschool curriculum, it did not address nature connectedness specifically. The fifth preschool was recruited from a rural area in northern Iceland and also represented a convenience sample. Although the pedagogical philosophies of the participating schools differed, all were public preschools operating under the Icelandic National Curriculum Guide for Preschools (Ministry of Education, Science, and Culture, 2011). As such, they shared common curricular goals related to outdoor play, environmental awareness, and child-centered learning.

All Icelandic-speaking children aged 4-6 years enrolled in the participating schools were invited to participate. A total of 123 children participated in the larger study. The Nature Connectedness Draw-and-Tell Task (NC-DTT) drawing activity was administered to all children so that each could engage in the creative component of the study. For the qualitative analysis presented here, 26 children (four to six from each school) were selected for transcription and translation of their interviews. This sampling approach was guided by expectations that thematic saturation would likely occur within this range of interviews (Francis et al., 2010).

Children were selected to participate in the NC-DTT interviews based on three criteria:

1. age, prioritizing older children within the sample to support more developed verbal expression (Berger, 2021);
2. completion of a background survey by parents as part of the larger study; and
3. gender, to ensure representation of boys and girls (the only genders reported in the dataset).

During transcription review, we discovered that children at the rural school had not been asked all interview questions. As a result, those five interviews were excluded from analysis. The final analytic sample consisted of 21 children (11 boys) aged 5-6 years ($M = 68$ months) from urban preschools in Iceland.

The sample was intentionally small and focused, consistent with qualitative descriptive research. The goal was not to estimate the prevalence or distribution of nature connectedness among Icelandic children, but rather to explore how preschool-aged children express their relationships with nature through drawings and conversation.

Materials

To examine children's perspectives on nature connectedness, we developed the Nature Connectedness Draw-and-Tell Task (NC-DTT). In this task, children were asked to draw themselves doing something in nature and then participated in a brief one-on-one interview about their drawing.

Drawings have long been used in psychological research to explore children's beliefs, perceptions, and feelings through non-written forms of expression (Cvencek & Meltzoff, 2015; Finson et al., 1995). In environmental psychology, drawing methods have been used to examine children's perceptions of environments such as schoolyards (Cronin-Jones, 2005), rainforests (Bowker, 2007; Pellier et al., 2014), and nature more broadly (Fraijo-Sing et al., 2020; Günindi, 2012).

The NC-DTT builds on the draw-and-tell technique (Driessnack, 2006), in which children create a drawing and then describe it verbally. This method has been shown to help elicit children's perspectives by providing visual retrieval cues and supporting narrative organization while reducing the social demands of a verbal-only interview (Driessnack, 2005). Because young children may find it difficult to articulate their thoughts and feelings through language alone, the drawing served as a visual prompt to facilitate conversation about their experiences with nature.

Although draw-and-tell approaches have previously been used to examine children's perceptions of nature (e.g., Ahi & Atasoy, 2019; Kalvaitis & Monhardt, 2015), they have rarely been used to explore children's nature connectedness specifically. The NC-DTT was designed to prompt children to reflect on nature not simply as a background setting but as a space of interaction and relationship. Rather than asking children to "draw yourself in nature," we asked them to depict themselves doing something in nature, based on the premise that active engagement would be more likely to elicit reflections related to emotional, cognitive, and behavioral dimensions of nature connectedness.

Example interview questions included:

- "Point to the nature in your drawing."
- "How does the nature in your drawing make you feel?"
- "Do you feel like you are a part of nature?"

The full NC-DTT protocol and interview prompts are provided in Appendix A.

Data Collection

Ethical approval for all aspects of the study was obtained from the University of Iceland Science Ethics Committee, followed by approvals from participating municipalities, school principals, teachers, parents, and children.

Data collection took place in preschools between February and March 2023. Prior to interviews, teachers administered the drawing task in Icelandic using a standardized prompt asking children to "draw yourself doing something in nature." Teachers were instructed not to provide examples or define nature in order to encourage children's own interpretations. At one preschool site, a teacher reported using the word "outside" as a follow-up prompt (e.g., "Think about yourself doing something outside in nature"). Children's drawings from that site were qualitatively similar to those from other schools, suggesting that this additional wording did not systematically influence responses. Appendix B includes examples of children's drawings.

Within 24 hours of completing the drawing activity, researchers conducted semi-structured interviews with children individually in a quiet location at the preschool (e.g., an empty classroom or resource room). Children aged 5-6 years have been shown to accurately recall events from the previous day (Busby & Suddendorf, 2005), making it likely they would remember what they had drawn. The interviews were conducted by senior undergraduate psychology

students who were native Icelandic speakers and had been trained on the research protocols. All interviewers had prior experience working with young children through family caregiving, babysitting, or formal and informal early childhood education contexts, and the study design and analytic procedures were overseen by the first author, who has more than 10 years of professional experience working in early childhood education settings. Prior to conducting interviews, researchers spent approximately 30 minutes in each classroom interacting with children to build rapport (Parkinson, 2001). Children were informed about the activity and asked whether they wished to participate. Participation required verbal assent, and children were reminded that they could stop the interview and return to class at any time. Interviews were audio-recorded using a tablet-based recording application and later transcribed and translated from Icelandic to English by a bilingual research assistant.

Data Analysis

All interview transcripts were uploaded and coded using Dedoose (Version 9.0.107). We employed qualitative content analysis as the overarching analytic approach (Mayring, 2014; Smith et al., 1992), which provides a systematic framework for analyzing textual and visual data while allowing patterns to be examined in relation to theoretically informed categories.

Because early childhood nature connectedness remains an emerging area of research, we used deductive content analysis guided by a theoretically informed coding framework. The initial codebook was developed based on a tripartite conceptualization of nature connectedness encompassing emotional, cognitive, and behavioral domains. Additional domains were included to capture theoretically relevant features of early childhood experiences with nature, including sociocultural context, ecological situatedness, and imaginative engagement. Together, these domains provided a structured framework for examining how children expressed relationships with nature across multiple dimensions of experience.

The six analytic domains were defined as follows:

1. **Emotional responses to nature** included explicit or implicit expressions of affective state, emotional evaluation, or feelings associated with nature, being in nature, or elements of nature (e.g., “fun,” “scary,” “beautiful”).
2. **Cognitive responses to nature** included statements reflecting perception, awareness, interpretation, evaluation, or conceptual reasoning about nature, such as observational attention, environmental evaluation, conceptual distinctions, and early environmental reasoning. Although interest in nature is affectively supported, references to interest in *studying nature* were interpreted as cognitive expressions because they reflected children’s orientation toward observing, learning about, and making sense of environmental features.
3. **Behavioral engagement with nature** included descriptions of actions children performed in nature or with natural elements. Because children were explicitly asked to draw themselves “doing something in nature,” behavioral engagement was expected; coding therefore focused on the types and meanings of behaviors described rather than the presence of behavior itself.
4. **Sociocultural embeddedness** included references to people, relationships, or culturally meaningful social roles associated with nature experiences. Because children were asked who they were with or wanted to be with in nature, coding focused on which relational partners were present and how children situated nature experiences within social contexts.
5. **Ecological situatedness** included references to specific living organisms, environmental features, and nearby ecological settings that reflected how children described their experiences of nature as embedded within the sensory and ecological contexts of their everyday environments.

6. **Imaginative and anthropomorphic engagement** included fantasy, magical thinking, anthropomorphism, or imaginative transformation involving nature. These expressions were interpreted as developmentally appropriate forms of meaning-making through which children expressed relationships with natural environments.

In addition to domain-level coding, we attended to children's expressions of empathy for nature, defined here as affiliative orientation, concern, or care toward natural elements or environments (Li et al., 2024). In early childhood research, empathy is often expressed through relational language (e.g., describing nature as a friend), concern about harm to living or environmental systems, or actions intended to protect or support nature (Giusti et al., 2014; Sobko et al., 2018). In the present study, empathy for nature was not treated as a separate analytic domain. Rather, empathy for nature was identified across emotional, cognitive, and behavioral responses when children expressed concern about environmental harm (e.g., removing trash so the Earth would not be damaged), described caring relationships with living things or natural environments, or reported actions intended to protect or support nature.

These six domains were treated as overlapping expressions of early nature connectedness rather than mutually exclusive categories, and multiple codes could be applied to the same segment when appropriate. Within each domain, subcodes were developed inductively to capture recurring patterns in children's responses. Coding focused on the meanings children attributed to nature rather than simply the presence of activities or social contexts prompted in the task. Codes were applied to meaningful statement units, and multiple codes could be assigned to the same segment when appropriate.

The first author conducted the primary coding. A second coder independently coded 10% of the interviews using the finalized codebook. The two coders applied the same codes to the same segments in nearly all cases; discrepancies related primarily to differences in the number of code applications rather than differences in code selection. These discrepancies were discussed until consensus was reached. Based on the analytic process and recurring patterns across interviews, data saturation was considered to have been reached within the final sample of 21 interviews (Francis et al., 2010).

Findings

Using deductive content analysis, children's responses were coded across six theoretically informed domains of ENC: emotional, cognitive, behavioral, sociocultural, ecological, and imaginative expressions. Because the draw-and-tell interview included structured prompts about children's activities, companions, and experiences in nature (see Appendix A), the analysis focused not simply on whether children mentioned these elements but on how they interpreted and described them.

Across domains, children articulated relationships with nature through affective experiences, observational judgments, everyday stewardship practices, familiar social relationships, locally recognizable ecological features, and, in some cases, imaginative elements.

Emotional Experiences of Nature Connectedness

Children's emotional responses to nature were most visible in their answers to questions such as:

"How does the nature in your drawing make you feel?"

"Are you fond of nature?"

"Do you feel scared or calm in nature?"

Across interviews, children frequently described their feelings about nature using positively valenced affective language, suggesting that enjoyment formed a central feature of how they articulated their relationships with natural environments. Nature was described as "fun," "entertaining," and "so enjoyable." Several children explained that they were friends with nature because "I love nature," "I love the stars," "it's so entertaining," and because

"she is good to me." One child said they were a friend of nature because "I think it's fun to listen to the bird songs." When asked whether they were fond of nature, children gave similar responses describing nature as "entertaining" and "so cool."

In some cases, however, children's responses extended beyond enjoyment to include expressions of concern for nature. For example, several children explained that they were fond of nature "because nature is really fragile," or "because I don't want the Earth to break" and they wanted to "care for the Earth." These responses suggest that emotional affinity toward nature sometimes included early expressions of empathy for the natural world.

Children also frequently associated nature with calmness or comfort. When asked whether they felt scared or calm in nature, most children reported feeling relaxed, with some explaining this was because "everything is so relaxed there" or because "it's so beautiful in nature." These responses suggest that natural environments were often experienced as emotionally regulating or pleasant spaces.

Although positive affect predominated children's responses, some described feeling fear or nervousness in particular situations. These emotional responses were typically associated with being alone in nature rather than with nature itself. For example, one child explained that they were scared when they were in nature without "mama and papa ... protecting me," while another reported feeling nervous "because I don't want to go away from mama." On the other hand, some expressed confidence in being alone in nature, with one child saying they are not afraid in nature "because I am older... so I'm not afraid of anything." These responses indicate that children's emotional experiences of nature were shaped not only by environmental features but also by the presence (or absence) of familiar caregivers.

Together, these findings suggest that children's emotional relationships with nature included both positive affinity and situational uncertainty, often structured by familiarity, perceived safety, and relational context.

Cognitive Experiences of Nature Connectedness

Cognitive expressions of nature connectedness were most visible in responses to questions such as:

"Can you point to the nature in your drawing?"

"Do you like to study nature?"

"Is the nature here clean or dirty?"

"Do you feel like you are a part of nature?"

When asked to identify the nature in their drawings, all children pointed to natural features of the environment (e.g., flowers, sun, grass), indicating that they were able to recognize and differentiate natural from built environmental elements. One child even pointed to the snowflakes they had drawn on their sweater, indicating those - but not the sweater - were part of nature. These responses suggest that children were able to identify nature as a distinct category within their surroundings rather than treating outdoor environments as undifferentiated spaces.

When asked whether they liked to study nature, most children responded affirmatively. Some described studying animals, while others referred to looking for or collecting trash in outdoor environments. Although these responses were typically brief, they suggest that children associated studying nature with observing living things and attending to conditions in their surrounding environments.

Children also demonstrated evaluative interpretations of environmental quality. When asked whether the nature in their drawing was clean or dirty, most children reported that it was clean and that this made them feel good. A smaller number of children focused specifically on the presence or absence of trash. For example, one child reported feeling bad "because so much trash has been thrown there [in nature]," while others described bottles or litter as making nature dirty. These responses suggest that children interpreted environmental conditions in normative terms and, in some cases, linked environmental quality with concern about harm to nature, consistent with early expressions of empathy for the natural world.

Children were also asked directly whether they felt like they were part of nature. To our knowledge, questions of this kind are rarely posed to children in this age range, in part because it has often been assumed that preschool-aged children may not yet be able to engage with abstract relational questions about humans' place within the natural world. In the present study, however, children were able to respond meaningfully to this prompt, even though their interpretations varied.

Several children answered "yes," sometimes providing affective explanations such as "because it's so much fun," "because I feel so well," "because [nature] is so very very VERY good to me," and "because I love to go out into nature." Other children offered categorical explanations for inclusion, such as "nature has trees and stuff," suggesting that they understood themselves as part of the broader category of nature, or "I am just a person," indicating that being human was understood as compatible with being part of nature. Some children answered "no," reporting they were not a part of nature because nature was "not fun," while one child explained they were not part of nature "because I am with mama and papa." This response suggests that belonging to nature may sometimes be interpreted through immediate social relationships, with the child positioning themselves as part of their family rather than as part of the natural environment.

Rather than reflecting a single shared understanding of belonging to nature, these responses suggest that children interpreted the question through multiple forms of reasoning, including affective experience, categorical inclusion, activity-based preferences, and references to familiar social relationships. Importantly, these findings indicate that preschool-aged children were able to engage meaningfully with questions about whether humans are part of nature, offering interpretable explanations grounded in their everyday experiences. This suggests that young children may be capable of reflecting on human-nature relationships earlier than is often assumed, even when their responses remain situated in concrete and relational understandings rather than abstract ecological reasoning.

Behavioral Expressions of Nature Connectedness

Behavioral expressions of nature connectedness were most visible in children's responses to prompts asking what they were doing in their drawings and what they did when spending time in nature. Because children were explicitly asked to depict themselves "doing something in nature," references to activities were expected; the analysis therefore focused on the types of actions children described and the meanings they attributed to those actions, rather than the presence of activity itself.

Across interviews, children described a range of activities in nature, many of which reflected direct engagement with natural environments through play and exploration. These included activities such as playing outside, walking, digging for worms, and camping. Other children described observational activities, such as looking at nature, watching birds, or noticing features of the sky. For example, one child explained: "I am looking at the moon, and the stars, and the rainbows, and...and relaxing in the grass, and also looking at the trees." These responses suggest that children often described their relationships with nature through attentive presence and exploratory interaction with environmental features.

In addition to play and observation, several children described stewardship-oriented behaviors. For example, one child described growing flowers, another described watering trees, and another explained they were "trying not to step on the flower." Across multiple interview questions, many children also referred to picking up trash in natural environments and sometimes described this activity as "fun" or "just fine," while only one child described trash collection as "boring." These behavioral descriptions suggest that, in early childhood, nature connectedness may be expressed through participation in observable and familiar activities rather than through abstract statements of environmental responsibility.

Together, these findings indicate that children expressed behavioral connections with nature through play, observation, and concrete acts of care, suggesting that early nature connectedness was often enacted through everyday interactions with living things and outdoor environments. In several cases, children framed these actions

in terms of preventing harm to nature, indicating that empathy for the natural world was sometimes expressed through action-oriented stewardship practices embedded in routine experiences.

Sociocultural Embeddedness of Nature Connectedness

Sociocultural expressions of nature connectedness were most visible in children's responses to prompts asking who they were with in their drawings and who they wanted to spend time with in nature. Because children were explicitly asked to identify companions in their drawings and nature experiences, references to other people were expected; analysis therefore focused on which relationships children described and how those relationships shaped the meaning of nature experiences.

Across interviews, many children described being in nature with family members, particularly parents and siblings. For example, several children explained that they were in nature with "mama and papa," while others described spending time in nature with extended family members. These responses suggest that children often situated their experiences of nature within familiar caregiving relationships rather than describing nature as an individual setting. Children also frequently referenced spending time in nature with friends, describing nature as a place for shared play and social interaction. Pets were also mentioned by a few children, indicating that some children included companion animals as part of their relational experiences in natural environments.

When asked who they wanted to be with in nature and why, most children indicated that they preferred to be with other people and reported feeling "very badly" or "afraid" when imagining themselves alone in nature. In one case, a child responded to this question in a tone suggesting that the answer was self-evident, explaining simply, "Because I don't want to be alone." This response suggests that, for some children, being with others in nature was treated as an expected or taken-for-granted aspect of nature experience rather than a deliberate preference. Other children explained that being with others made nature more enjoyable because they could play together.

At the same time, several children indicated that they sometimes preferred to be alone in nature. For example, one child stated, "I want to be alone in nature," while another explained they preferred being alone "because there's nobody to distract me." These responses suggest that children's experiences of nature were shaped both by expectations of shared activity and, in some cases, by opportunities for privacy and focused attention.

Taken together, these responses indicate that young children frequently experienced nature as a relational and socially facilitated context, structured by family routines, peer interactions, and shared everyday activities. Rather than describing nature as a primarily solitary setting, children often interpreted nature experiences through the presence - or absence - of familiar social partners, suggesting that relationships with caregivers, peers, and companion animals form an important context through which early nature connectedness is experienced and interpreted.

Ecological Situatedness of Nature Connectedness

Ecological features of children's nature connectedness were most visible in responses describing where the nature in their drawings was located and what elements were present in those environments. Rather than depicting generalized or symbolic representations of nature, children consistently situated their drawings within familiar and locally meaningful places.

Across interviews, many children identified the settings in their drawings as specific locations connected to everyday experience, including their homes, school grounds, nearby forests, gardens, or places associated with extended family members. For example, children described drawing nature "in the garden at home," "at the playschool," "directly across from where I live," or at relatives' homes in nearby towns. These responses suggest that children most often represented nature as something encountered within ordinary routines rather than as distant wilderness environments.

Children's drawings also reflected recognizable ecological features of their immediate surroundings. Many included grass, flowers, trees, moss-covered stones, birds, rain, and coastal or weather-related elements such as rainbows or sea sounds. In some cases, children incorporated highly specific features linked to their personal environments, such as watching birds with parents in a forest setting, digging worms in a home garden, or standing on a deck outside their house. These details indicate that children's representations of nature were closely tied to lived experience rather than abstract environmental categories.

Several drawings also reflected features associated with particular institutional or family contexts. For example, children depicted playground areas at school, nearby wooded spaces used for family activities such as camping, and trees or plants located in home environments. In some cases, children included environmental features that appeared to correspond to recently altered landscapes, such as tree stumps remaining after removal of trees. Together, these responses suggest that children's representations of nature were shaped by the specific ecological settings in which their everyday lives unfolded.

Notably, children's drawings did not emphasize large or iconic landscape features often associated with representations of Icelandic nature, such as mountains or volcanoes. Instead, children primarily depicted small-scale, familiar elements such as grass, trees, flowers, birds, stones, and nearby forested areas. This pattern suggests that children's experiences of nature were grounded in proximal and routinely encountered environments rather than in culturally prominent but less frequently inhabited landscapes.

Taken together, these findings indicate that children's representations of nature were strongly situated within local ecological contexts and everyday activity spaces. Rather than depicting nature as a distant or abstract category, children most often represented nature as something embedded within familiar places, relationships, and routines.

Imaginative and Anthropomorphic Expressions of Nature Connectedness

Imaginative expressions of nature connectedness were most visible in children's descriptions of what was happening in their drawings and how they interpreted the environments they depicted. These prompts invited children to explain their activities in nature, and several children incorporated fantasy, transformation, or narrative elements into their accounts.

Some children described natural environments as places where imaginative transformations could occur. For example, one child described watering a tree to create a "magic cave," while another described a tree that could transform into multiple objects, including a trampoline and an airplane. Other children incorporated unusual or symbolic elements into otherwise familiar natural settings, such as eating avocados growing in place or encountering imagined creatures in forest environments. These responses suggest that children sometimes interpreted natural environments as flexible and creative spaces shaped through imaginative play and storytelling.

In addition to narrative transformations, two children represented natural elements using anthropomorphic features, drawing faces on the sun or flowers. Notably, faces were not drawn on non-natural objects within the same drawings. Although children did not explicitly describe these elements as watching or responding to them, the selective use of facial features on natural elements suggests that some children represented components of nature as socially meaningful or relationally expressive.

Taken together, these responses indicate that imaginative play formed one way that children interpreted and described their experiences in nature. In early childhood, such imaginative and anthropomorphic representations may reflect developmentally appropriate forms of meaning-making through which children engage with natural environments as active and meaningful components of their experiential worlds.

Discussion

The present study examined how preschool-aged children described their experiences of nature through drawings and interviews using a multidimensional framework of ENC. Across emotional, cognitive, behavioral, relational,

ecological, and imaginative expressions, children consistently described nature as enjoyable, socially shared, locally situated, and embedded in familiar routines. Together, these findings suggest that ENC is structured less by abstract environmental concepts than by everyday relationships, places, and experiences.

Early Nature Connectedness as Socially Structured

Research on ENC consistently describes young children's relationships with nature in affective and relational terms, including enjoyment, curiosity, empathy, and care for living things (Barrable, 2019b; Beery et al., 2020; Chawla, 2020). Measures developed for preschool-aged children similarly conceptualize connectedness through dimensions such as enjoyment of nature, empathy for nature, and responsibility toward nature (e.g., Beery et al., 2024; Rice & Torquati, 2013; Sobko et al., 2018). Together, this work suggests that ENC is strongly relational. However, most of this literature has focused on children's relationships with nature itself rather than on the social contexts through which those relationships are experienced and interpreted.

In the present study, children's descriptions of nature experiences were consistently embedded within familiar interpersonal relationships, particularly those involving parents, siblings, friends, and companion animals. When asked who they preferred to be with in nature, most children indicated that they wanted to be with others rather than alone, and several described feeling uncomfortable when imagining themselves alone in nature. In one case, a child explained that they preferred to be with family members simply "because I don't want to be alone," suggesting that shared experience was treated as an expected feature of being in nature rather than a deliberate preference. This pattern is consistent with previous studies showing that children often include parents, peers, extended family members, and teachers in their drawings of nature (Ahi & Atasoy, 2019; Fraijo-Sing et al., 2020; Günindi, 2012). Across these studies, including the present one, references to home environments and parent relationships were especially prominent in children's descriptions of nature experiences. Notably, this pattern was observed even in a context such as Iceland, where outdoor time in preschool settings is common, suggesting that family relationships may remain central to early nature experiences even when institutional opportunities for nature engagement are extensive (Chawla, 2020; Passmore et al., 2020).

In some instances, children also interpreted questions about whether they were part of nature through these same relational frameworks. For example, one child explained they were not part of nature "because I am with mama and papa," indicating that belonging to nature was understood through social belonging rather than as an abstract ecological category. This suggests that questions about human-nature relationships may be interpreted through familiar relational frameworks in early childhood.

This interpretation is consistent with ecological and sociocultural theories of development, which emphasize that children's understandings of the world emerge through participation in everyday relationships and routines (Bronfenbrenner & Morris, 1995; Elliott & Davis, 2020; Rogoff, 2003). Research in childhood geography similarly demonstrates that children's experiences of place are structured through family practices, peer relationships, and local mobility patterns rather than through abstract spatial categories (Corvalán & Ther-Ñancuvilú, 2025; Min & Lee, 2006; Rasmussen, 2004). Further, recent intervention research in Swedish school-age education settings shows that collaborative nature experiences with peers and teachers support children's emotional engagement with nature and sense of connectedness (Wünsche et al., 2025). Within environmental education research, studies have also shown that meaningful nature experiences in early childhood often occur through shared activities with caregivers and peers (Ardoín & Bowers, 2020; Norðdahl & Einarsdóttir, 2014; Sihvonen et al., 2024; Smedsrud et al., 2023).

Together, these findings suggest that ENC is not only relational with respect to the natural world itself but also socially structured through the relationships within which children encounter and interpret nature, indicating that social belonging may form an important context through which young children interpret their place within the natural world.

Early Nature Connectedness is Local, Familiar, and Routine - Not Wilderness-Based

In the present study, children's expressions of ENC were grounded primarily in familiar everyday environments rather than in remote or wilderness settings. Most children drew themselves at home or school, while others depicted nature experiences at a friend's or relative's house or in nearby forested areas. These findings suggest that young children most often represent nature as something encountered within routine microsystem contexts rather than as a distant or exceptional environment. Notably, children did not typically depict large or iconic landscape features often associated with representations of Icelandic nature, such as mountains, further suggesting that ENC is grounded in lived ecological experience rather than symbolic environmental imagery.

This pattern is consistent with theoretical perspectives emphasizing the importance of local ecological experience in early childhood development (Beery et al., 2020; Chawla, 1992). It also aligns with previous drawing-based studies showing that young children in Turkey and Mexico most often depict nature within everyday environments such as homes, schools, parks, cities, hospitals, and zoos (Ahi & Atasoy, 2019; Fraijo-Sing et al., 2020; Günindi, 2012). Together, these studies suggest that children's representations of nature tend to reflect the immediate environments in which they live rather than broader regional or culturally iconic landscapes.

In the present study, children's drawings also reflected characteristics of Iceland's local ecological context. For example, while animals were among the most frequently depicted features in comparable studies conducted in other countries (Fraijo-Sing et al., 2020; Günindi, 2012), very few animals appeared in children's drawings in this sample beyond humans and one butterfly. This pattern likely reflects the relatively limited terrestrial fauna in Iceland (Baldursson, 2014), suggesting that children's representations of nature correspond closely to the ecological features available within their everyday surroundings.

Importantly, these findings indicate that young children were connecting with the nature immediately accessible within their daily lives rather than with distant or idealized forms of nature. This contrasts with research on adults, in which "nature" is often conceptualized as separate from everyday environments and associated with locations away from home or routine activity settings (Clayton, 2003; Nisbet et al., 2009). The present findings therefore suggest that ENC may emerge through engagement with nearby ecological features embedded in children's microsystem contexts.

This interpretation is further supported by research showing that regular experiences in local nature settings - particularly those embedded in daily routines - are associated with stronger nature affinity in early childhood (Barrable & Booth, 2020a; Giusti et al., 2014; Kokkonen et al., 2022; Sauli et al., 2025). Together, these findings highlight the importance of everyday environments such as schoolyards, home gardens, neighborhood green spaces, and nearby forests as meaningful contexts for ENC. Further, because these environments are widely accessible compared to remote natural areas, supporting children's relationships with nearby nature may represent an important pathway for promoting equitable opportunities for early nature engagement.

Preschoolers Can Meaningfully Interpret Questions About Belonging to Nature

Children in the present study were able to respond meaningfully to questions about whether they felt like they were part of nature, offering both affirmative and negative answers as well as explanations for their responses. This finding aligns with Fraijo-Sing and colleagues (2020), who similarly reported that many young children described themselves as part of nature, although children in that study were not asked to explain their reasoning. In contrast, children in the present study provided explanations that offered insight into how they interpreted the question.

Children's explanations reflected multiple forms of reasoning. Many responses were affective, with children describing themselves as part of nature because nature was "fun," "beautiful," or "good" to them. Other responses reflected categorical or descriptive reasoning, such as identifying humans as part of the natural world or distinguishing between people and other environmental elements. In a small number of cases, children interpreted belonging to nature through relational contexts, for example explaining that they were not part of nature "because I am with mama and papa." Together, these responses suggest that preschool-aged children interpret questions

about belonging to nature through experiential, conceptual, and relational frameworks rather than treating them as abstract or inaccessible ideas.

This finding is notable given that several existing measures of ENC have avoided or modified items related to “oneness with nature” because they were assumed to be developmentally inappropriate for young children. For example, in adapting the Connectedness to Nature Index for Parents of Preschool Children (CNI-PPC), items referring to oneness with nature were replaced with items assessing awareness of nature after parents reported difficulty interpreting the construct for preschool-aged children (Sobko et al., 2018). Similarly, a systematic review by Arola and colleagues (2023) found that some quantitative studies removed items related to human–nature connectedness because children appeared not to understand them, raising questions about whether these difficulties reflected developmental limitations or mismatches between measurement language and children’s own ways of describing their relationships with nature. Relatedly, Beery and colleagues (2024) reported that children sometimes interpreted pictorial “overlapping circles” measures as representing physical proximity rather than psychological belonging, further complicating interpretation of ENC measures.

Although affective explanations for belonging to nature might appear less conceptually explicit than cognitive accounts of human-nature connectedness, they are developmentally meaningful in early childhood. Affective experience plays a foundational role in shaping children’s emerging interpretations of the world and their relationships within it (Barrett, 2017; Frijda et al., 2000). In this way, early affective expressions of belonging to nature may contribute to the later development of more explicit understandings of human-nature relationships, including a sense of oneness with the natural world (Beery et al., 2020; Cheng & Monroe, 2012; Schultz, 2000).

Importantly, all children in the present study were able to provide either affirmative or negative responses to the question of whether they were part of nature. While this pattern may reflect the concrete response styles typical of early childhood (Berger, 2021), it also suggests that preschool-aged children were able to engage with the question itself and interpret it in meaningful ways. Taken together, these findings indicate that early understandings of human-nature belonging may be more accessible in early childhood than is often assumed and that attending to children’s own interpretations of these questions may provide new opportunities for studying the development of nature connectedness across early childhood (Chawla, 2007, 2020; Whitburn et al., 2020).

Anthropomorphic Representation Appears Selectively Applied to Natural Elements

One exception to the generally concrete and place-based nature of children’s drawings involved anthropomorphic representations of natural elements. In the present study, only two children drew facial expressions on components of nature (a butterfly and the sun). Similar patterns have been reported in drawing-based studies conducted in other cultural contexts, where children depicted faces on plants, animals, and environmental features such as clouds or the sun (Fraijo-Sing et al., 2020; Günindi, 2012; Profice, 2015). Notably, in the present study children did not draw facial expressions on non-natural elements. This pattern suggests that anthropomorphic features may be selectively applied to natural rather than built elements in children’s representations of the environment.

Previous research indicates that anthropomorphic thinking is common in early childhood and may reflect developmentally typical ways of interpreting non-human entities. For example, children between approximately five and nine years of age frequently attribute emotions, intentions, or mental states to animals and natural phenomena (Severson & Woodard, 2018; Severson & Lemm, 2016). Drawing-based studies across cultural contexts similarly document anthropomorphic features in representations of suns, plants, and other non-animal natural elements (Fraijo-Sing et al., 2020; Profice, 2015). Related research has also shown that children’s understandings of human-nature relationships may include both anthropocentric and ecocentric orientations during early and middle childhood (Hallås & Heggen, 2018), suggesting variability in how children position humans relative to other elements of the natural world.

Importantly, research also indicates that anthropomorphic and animistic representations of nature vary across cultural contexts. For example, Profice (2018) found that drawings by Indigenous Tupinambá children in Brazil included animistic features such as faces on environmental elements far more frequently than drawings by children

in New York, interpreting this difference as reflecting cultural traditions in which nature is understood as a living and relational presence. Similarly, Merewether (2019) describes “enchanted animism” in Australian early childhood contexts, where children treated trees, rocks, weather, and landforms as intentional relational partners rather than as passive background elements. Related experimental research with Ngöbe communities in Panama suggests that animist reasoning may reflect ecocentric conceptual frameworks in which agency is inferred through relationships and interactions rather than through human-like mental states (Mays et al., 2020). Research with Menominee and European American children likewise demonstrates that culturally distinct epistemological orientations shape how children organize ecological knowledge and understand humans’ place within nature (Bang et al., 2014).

In comparison with studies conducted in other cultural contexts, anthropomorphic representations were relatively infrequent in the present study. One possible explanation is the strong emphasis on sustainability and environmental education within Icelandic early childhood settings, where children’s encounters with nature are often structured through regular engagement with local environments as part of broader commitments to environmental responsibility and the Sustainable Development Goals (Norðdahl et al., 2025; Norðdahl & Jóhannesson, 2015). At the same time, research in other contexts suggests that anthropomorphic representations of animals and nature can support concern for animal welfare and environmental protection (Wan et al., 2020). The relatively limited use of anthropomorphism observed in the present study may therefore reflect a sustainability-oriented educational context rather than a general developmental pattern, highlighting that anthropomorphic representations may play different roles across cultural and pedagogical settings.

Taken together, these findings suggest that while anthropomorphic representations form one way that some children express relationships with nature, they were not the dominant mode through which ENC was represented in this sample. Instead, children’s drawings more often reflected direct engagement with familiar environmental features, with anthropomorphic elements appearing selectively and in relation to natural rather than built components of the environment.

Implications for Early Childhood Environmental Education

The findings of this study offer several implications for early childhood environmental education. First, children frequently described their experiences in nature in terms of enjoyment, relaxation, and pleasant feelings. These responses suggest that positive emotional experiences play an important role in how young children relate to natural environments. For educators, this highlights the importance of providing opportunities for children to experience nature as a place of exploration, play, and enjoyment rather than focusing exclusively on formal environmental instruction. Previous research similarly suggests that early affective experiences in nature support the development of long-term environmental concern and engagement (Chawla, 2007; 2020; DeVille et al., 2021; Rosa et al., 2018). As research suggests, opportunities for unstructured outdoor play, exploration of natural materials, and regular engagement with nearby natural environments may therefore support children in forming meaningful early relationships with nature (Barrable, 2019a; Barrable & Booth, 2020a; Beery, 2025).

Second, many children described caring for nature through concrete actions, particularly removing trash or participating in activities such as planting or watering plants. These examples suggest that environmental care in early childhood may be most meaningful when it is embedded in visible and accessible activities that children can participate in directly. Early childhood programs may therefore benefit from incorporating everyday stewardship practices - such as gardening, caring for plants, or participating in simple cleanup activities - into nature-based learning experiences. Such activities align with research showing that participation in routine nature-based practices can support children’s developing sense of environmental responsibility and belonging (Barrable & Booth, 2020a; Giusti et al., 2014).

Third, children frequently described nature experiences in relation to familiar people and places, including family members, friends, preschool environments, and recognizable outdoor locations. These findings highlight the relational and place-based nature of young children’s experiences with the natural world. Environmental education initiatives for young children may therefore benefit from recognizing the importance of everyday outdoor spaces - such as schoolyards, gardens, neighborhood parks, and other familiar environments - as meaningful contexts for

nature engagement. Further, this reflects recent findings from school-age settings in Sweden where collaborative activities with peers and teachers in nearby natural environments support children's sense of connectedness and provide opportunities for both curricular and exploratory learning (Wünsche et al., 2025).

In the present study, children's drawings also reflected features of their local ecological surroundings, suggesting that nature connectedness was grounded in nearby environments rather than distant or idealized landscapes. Supporting children's engagement with familiar ecological settings - particularly those embedded within daily routines - may therefore represent an important pathway for promoting equitable opportunities for early nature connection (Beery et al., 2020; Giusti et al., 2014).

Finally, the imaginative elements present in some children's narratives suggest that creative and playful engagement can be part of how young children interpret their experiences in nature. Outdoor environments may offer opportunities for imaginative play, storytelling, and exploration that support children's engagement with natural spaces. At the same time, research suggests that imaginative engagement with nature varies across cultural and educational contexts, reflecting different epistemological orientations toward the more-than-human world (Bang et al., 2014; Merewether, 2019; Profice, 2018). Within many early childhood settings, playful interaction with natural environments has been associated with curiosity, meaning-making, and emotional connection to place (Malone, 2016; Kahn & Kellert, 2002; Sobel, 1996). Taken together, these findings suggest that imagination represents one pathway through which children interpret their relationships with nature, while the form and significance of such engagement are shaped by the cultural and pedagogical contexts in which nature experiences occur.

Cumulatively, these findings highlight the importance of culturally responsive approaches to early childhood environmental education. Children's descriptions of nature were closely connected to everyday routines, relationships, and locally meaningful environments rather than abstract or universalized ideas about the natural world. This suggests that early environmental learning may be most meaningful when it builds on children's existing relationships with their environments and communities. Culturally responsive environmental education frameworks emphasize recognizing multiple ways of knowing and relating to nature, including those grounded in family practices, community contexts, and local ecological knowledge (Bang et al., 2007; Evans, 2023; Merewether, 2019). Rather than focusing primarily on environmental knowledge acquisition, programs that support children's emotional, social, and experiential engagement with nearby environments may provide important foundations for later environmental learning and stewardship (Ardoin et al., 2020; Barrable, 2019a; Chawla, 2007).

Limitations

Several limitations should be considered when interpreting the findings of this study. First, the sample was relatively small and drawn from a limited number of urban preschools in Iceland. Although the interviews yielded varied descriptions of children's experiences in nature, the sample does not capture the full range of ways young children may relate to natural environments. In particular, children in this study were enrolled in preschools where outdoor play and sustainability-oriented nature education were common, which may influence the types of experiences and narratives children described. The goal of the study was descriptive rather than to estimate the prevalence of particular expressions of nature connectedness; nevertheless, the sample characteristics limit the generalizability of the findings. Future research could include larger and more diverse samples across different geographic, cultural, and educational contexts to explore how expressions of early nature connectedness may vary across settings.

Second, the draw-and-tell interview method shaped the types of responses children provided. Children were asked to draw themselves doing something in nature and to describe who they were with, which meant that references to activities and companions were expected. While these prompts helped create a developmentally appropriate way for children to talk about their experiences, they may also have influenced the structure of children's responses, including the emphasis on familiar locations and everyday social relationships. Importantly, however, children's drawings and narratives varied widely in the types of activities, relationships, and environmental features they described, suggesting that children interpreted the prompts in diverse ways. Future research could complement draw-and-tell interviews with additional observational or play-based methods to capture children's experiences in nature in different ways.

Third, although the draw-and-tell method allowed children to express their thoughts and experiences through both drawings and conversation, the approach still relies on children's verbal explanations of their drawings. Young children may have internal experiences or emotional responses - such as empathy for living things or feelings of awe - that are difficult to articulate verbally. As a result, the interviews likely capture only part of children's experiences in nature. Future studies could incorporate additional methods, such as observations of outdoor play, narrative reenactments, or child-led storytelling, to better capture the range of ways young children experience and interpret the natural world.

Finally, as with all qualitative research involving young children, the interpretation of themes involves an element of researcher interpretation. To support transparency and minimize interpretive bias, the analysis prioritized children's own language and included direct quotations to illustrate patterns identified in the data. Coding was guided by a deductive framework informed by existing literature on nature connectedness while remaining attentive to patterns that emerged within children's narratives. Nevertheless, the themes presented here should be understood as interpretive descriptions of patterns in children's responses rather than definitive claims about how young children experience nature.

Conclusion

This study explored how preschool-aged children described their experiences in nature through interviews and drawings. The findings suggest that young children's nature connectedness was most often expressed through familiar places, everyday activities, and relationships with people who were part of their regular experiences in natural environments. Rather than describing nature primarily as distant or symbolic landscapes, children represented nature as something encountered within local settings and shared routines. In addition, children were able to respond meaningfully to questions about whether they felt they were part of nature, suggesting that early understandings of human-nature relationships may be more accessible in early childhood than is often assumed. Anthropomorphic elements appeared selectively in children's drawings and were applied only to natural rather than built features, indicating that some children represented components of nature as socially meaningful elements within their environments.

Together, these findings highlight the importance of considering early nature connectedness as socially structured, locally situated, and grounded in everyday experience. By examining children's own narratives about nature, this study contributes to a growing body of research seeking to better understand how relationships with the natural world are expressed in early childhood. These insights suggest that early childhood environmental education may benefit from approaches that support children's engagement with nearby ecological environments, familiar social contexts, and opportunities for exploration and play as foundations for later environmental learning and stewardship.

AI Disclosure Statement

The authors used ChatGPT (OpenAI, GPT-5.3) to assist with reviewing and revising the manuscript. The tool was used to provide feedback on the organization, clarity, and presentation of the analysis and to simulate reviewer-style critique during the revision process. The AI system did not generate data, conduct coding, or independently determine analytical findings. All data analysis, coding decisions, interpretations, and final manuscript content were conducted and approved by the authors.

References

- Annu, & Singh, C. (2021). The Emergence of Emotional Intelligence and Self- Regulation in Early Years. *Current Journal of Applied Science and Technology*. <https://doi.org/10.9734/cjast/2021/v40i1731434>.
- Ahi, B., & Atasoy, V. (2019). A phenomenographic investigation into preschool children's relationships with nature through drawings. *International Research in Geographical and Environmental Education*, 28(4), 281-295. <https://doi.org/10.1080/10382046.2019.1649248>

- Ardoín, N., & Bowers, A. (2020). Early childhood environmental education: A systematic review of the research literature. *Educational Research Review*, 31, 100353 - 100353. <https://doi.org/10.1016/j.edurev.2020.100353>.
- Ardoín, N. M., Bowers, A. W., & Gaillard, E. (2020). Environmental education outcomes for conservation: A systematic review. *Biological Conservation*, 241, 108224. <https://doi.org/10.1016/j.biocon.2019.108224>
- Arola, T., Aulake, M., Ott, A., Lindholm, M., Kouvonen, P., Virtanen, P., & Paloniemi, R. (2023). The impacts of nature connectedness on children's well-being: Systematic literature review. *Journal of Environmental Psychology*. <https://doi.org/10.1016/j.jenvp.2022.101913>.
- Baldursson, S. (2014). Lífríki Íslands: Vistkerfi lands og sjávar [Iceland's biosphere: Land and sea ecosystem]. Bókaútgáfan Opna and Forlagið.
- Bang, M., Medin, D., & Atran, S. (2007). Cultural mosaics and mental models of nature. *Proceedings of the National Academy of Sciences*, 104, 13868 - 13874. <https://doi.org/10.1073/pnas.0706627104>.
- Barrable, A. (2019a). Refocusing environmental education in the early years: A brief introduction to a pedagogy for connection. *Education Sciences*, 9(1), 61. <https://doi.org/10.3390/educsci9010061>
- Barrable, A. (2019b). The case for nature connectedness as a distinct goal of early childhood education. *International Journal of Early Childhood Environmental Education*, 6(2), 59-70. <https://eric.ed.gov/?id=EJ1225651>. .
- Barrable, A., & Booth, D. (2020a). Increasing nature connection in children: A mini review of interventions. *Frontiers in Psychology*, 11, 492. <https://doi.org/10.3389/fpsyg.2020.00492>
- Barrable, A., & Booth, D. (2020b). Nature connection in early childhood: A quantitative cross-sectional study. *Sustainability*, 12(1), 375. <https://doi.org/10.3390/su12010375>.
- Barrable, A., Friedman, S., & Beloyianni, V. (2024). Nature connection in adulthood: The role of childhood nature experiences. *People and Nature*, 6(4), 1571-1580. <https://doi.org/10.1002/pan3.10657>
- Barragan-Jason, G., Loreau, M., De Mazancourt, C., Singer, M., & Parmesan, C. (2023). Psychological and physical connections with nature improve both human well-being and nature conservation: A systematic review of meta-analyses. *Biological Conservation*. <https://doi.org/10.1016/j.biocon.2022.109842>.
- Barrett, L. F. (2017). The theory of constructed emotion: an active inference account of interoception and categorization. *Social Cognitive and Affective Neuroscience*, 12(1), 1-23. <https://doi.org/10.1093/scan/nsw154>
- Beery, T. (2025). Landscape pedagogy for environmental and outdoor educators. *Environmental Education Research*, 31(9), 1958-1968. <https://doi.org/10.1080/13504622.2025.2505188>
- Beery, T., Chawla, L., & Levin, P. (2020). Being and becoming in nature: Defining and measuring connection to nature in young children. *International Journal of Early Childhood Environmental Education*, 7(3), 3-22. <https://files.eric.ed.gov/fulltext/EJ1264523.pdf>.
- Beery, T., Fridberg, M., Præstholt, S., Wünsche, T., & Bølling, M. (2024). Connectedness to nature: A tale of three scales. *Environmental Education Research*, 30, 1783 - 1805. <https://doi.org/10.1080/13504622.2024.2320342>
- Beery, T., & Jørgensen, K. (2018). Children in nature: Sensory engagement and the experience of biodiversity. *Environmental Education Research*, 24, 13 - 25. <https://doi.org/10.1080/13504622.2016.1250149>.
- Beery, T., Stahl Olafsson, A., Gentin, S., Maurer, M., Stålhammar, S., Albert, C., ... & M. Raymond, C. (2023). Disconnection from nature: Expanding our understanding of human–nature relations. *People and Nature*, 5(2), 470-488. <https://doi.org/10.1002/pan3.10451>
- Berger, K.S. (2021). *The developing person through childhood and adolescence*. Worth Publishers.
- Bowker, R. (2007). Children's perceptions and learning about tropical rainforests: An analysis of their drawings. *Environmental Education Research*, 13(1), 75-96. <https://doi.org/10.1080/13504620601122731>
- Bronfenbrenner, U., & Morris, P. A. (1995). The bioecological model of human development. *Handbook of child psychology*. John Wiley & Sons, Inc.
- Busby, J., & Suddendorf, T. (2005). Recalling yesterday and predicting tomorrow. *Cognitive Development*, 20(3), 362-372. <https://doi.org/10.1016/j.cogdev.2005.05.002>
- Chawla, L. (2021). Knowing nature in childhood: Learning and well-being through engagement with the natural world. In A. R. Schutte, J. C. Torquati, & J. R. Stevens (Eds.), *Nature and psychology: Biological, cognitive, developmental, and social pathways to well-being*, (pp. 153-193). Springer.

- Chawla, L. (2020). Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. *People and Nature*, 2(3), 619-642. <https://doi.org/10.1002/pan3.10128>.
- Chawla, L. (2015). Benefits of nature contact for children. *Journal of Planning Literature*, 30(4), 433-452. <https://doi.org/10.1177/0885412215595441>.
- Chawla, L. (2007). Childhood experiences associated with care for the natural world: A theoretical framework for empirical results. *Children Youth and Environments*, 17(4), 144-170. <https://doi.org/10.1353/cye.2007.0010>
- Cheng, J. C. H., & Monroe, M. C. (2012). Connection to nature: Children's affective attitude toward nature. *Environment and Behavior*, 44(1), 31-49. <https://doi.org/10.1177/0013916510385082>.
- Choe, E., & Sheffield, D. (2024). Rebuilding human-nature connections in children and adolescents: Insights from a meta-analysis. *Environmental Education Research*, 31, 245 - 261. <https://doi.org/10.1080/13504622.2024.2404206>.
- Clayton, S. (2003). Environmental identity: A conceptual and an operational definition. In S. Clayton & S. Opatow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 45-65). MIT Press.
- Corvalán, A., & Ther-Ñancuvilú, S. (2025). Children's everyday mobility practices and experiences in Tabón Island, southern Chile. *Children's Geographies*, 23, 709 - 723. <https://doi.org/10.1080/14733285.2025.2556419>.
- Cronin-Jones, L. L. (2005). Using drawings to assess student perceptions of schoolyard habitats: A case study of reform-based research in the United States. *Canadian Journal of Environmental Education*, 10(1), 225-240. <https://files.eric.ed.gov/fulltext/EJ881787.pdf>
- Cvencek, D., & Meltzoff, A. N. (2015). Developing implicit social cognition in early childhood: Methods, phenomena, prospects. In S. Flannery Quinn & S. Robson (Eds.), *The Routledge international handbook of young children's thinking and understanding* (pp. 43-53). Routledge.
- DeVile, N., Tomasso, L., Stoddard, O., Wilt, G., Horton, T., Wolf, K., Brymer, E., Kahn, P., & James, P. (2021). Time Spent in Nature Is Associated with Increased Pro-Environmental Attitudes and Behaviors. *International Journal of Environmental Research and Public Health*, 18. <https://doi.org/10.3390/ijerph18147498>
- Driessnack, M. (2005). Children's drawings as facilitators of communication: A meta-analysis. *Journal of Pediatric Nursing*, 20(6), 415-423. <https://doi.org/10.1016/j.pedn.2005.03.011>
- Driessnack, M. (2006). Draw-and-tell conversations with children about fear. *Qualitative Health Research*, 16(10), 1414-1435. <https://doi.org/10.1177/1049732306294127>
- Elliott, S., & Davis, J. M. (2020). Challenging taken-for-granted ideas in early childhood education: A critique of Bronfenbrenner's Ecological Systems Theory in the age of post-humanism. In A. Cutter-Mackenzie-Knowles, K. Malone, and E. B. Hacking (Eds.), *Research handbook on childhoodnature: Assemblages of childhood and nature research* (pp. 1119-1154). Springer.
- Evans, N. M. (2023). Trauma-informed environmental education: Helping students feel safe and connected in nature. *The Journal of Environmental Education*, 54(2), 85-98. <https://doi.org/10.1080/00958964.2022.2163220>
- Finson, K. D., Beaver, J. B., & Cramond, B. L. (1995). Development and field test of a checklist for the Draw-A-Scientist test. *School Science and Mathematics*, 95(4), 195-205. <https://doi.org/10.1111/j.1949-8594.1995.tb15762.x>
- Flyvbjerg, B. (2004). Five misunderstandings about case-study research. *Sociologisk Tidsskrift*, 12(2), 117-142. <https://doi.org/10.18261/ISSN1504-2928-2004-02-02>.
- Fraijo-Sing, B. S., Beltrán Sierra, N. I., Tapia-Fonllem, C., & Valenzuela Peñúñuri, R. (2020). Pictographic representations of the word "Nature" in preschool education children. *Frontiers in Psychology*, 11, 575. <https://doi.org/10.3389/fpsyg.2020.00575>.
- Francis, J. J., Johnston, M., Robertson, C., Glidewell, L., Entwistle, V., Eccles, M. P., & Grimshaw, J. M. (2010). What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology and Health*, 25(10), 1229-1245. <https://doi.org/10.1080/08870440903194015>
- Frijda, N. H., Manstead, A. S., & Bem, S. (2000). The influence of emotions on beliefs. In N.H. Frijda, A.S.R. Manstead, & S. Bem (Eds.), *Emotions and beliefs: How feelings influence thoughts* (pp. 1-9). Cambridge University Press.
- Geerdts, M. S. (2016). (Un) real animals: Anthropomorphism and early learning about animals. *Child Development Perspectives*, 10(1), 10-14. <https://doi.org/10.1111/cdep.12153>
- Giusti, M., Barthel, S., & Marcus, L. (2014). Nature routines and affinity with the biosphere: A case study of preschool children in Stockholm. *Children, Youth and Environments*, 24(3), 16-42. <https://dx.doi.org/10.1353/cye.2014.0019>.

- Giusti, M., Svane, U., Raymond, C. M., & Beery, T. H. (2018). A framework to assess where and how children connect to nature. *Frontiers in Psychology*, 8, 2283. <https://doi.org/10.3389/fpsyg.2017.02283>
- Green, C., Kalvaitis, D., & Worster, A. (2016). Recontextualizing psychosocial development in young children: A mode of environmental identity development. *Environmental Education Research*, 22(7), 1025-1048. <https://doi.org/10.1080/13504622.2015.1072136>
- Greider, T., & Garkovich, L. (2010). Landscapes: The social construction of nature and the environment. *Rural Sociology*, 59, 1-24. <https://doi.org/10.1111/j.1549-0831.1994.tb00519.x>.
- Guazzini, A., Valdrighi, G., Fiorenza, M., & Duradoni, M. (2025). The relationship between connectedness to nature and pro-environmental behaviors: A systematic review. *Sustainability*. <https://doi.org/10.3390/su17083686>.
- Günindi, Y. (2012). Environment in my point of view: Analysis of the perceptions of environment of the children attending to kindergarten through the pictures they draw. *Procedia-Social and Behavioral Sciences*, 55, 594-603.
- Hallås, B. O., & Heggen, M. P. (2018). "We Are All Nature": Young children's statements about nature. In N. Goga, L. Guanio-Uluru, B. O. Hallås, & A. Nyrrnes (Eds.) *Ecocritical Perspectives on Children's Texts and Cultures: Nordic Dialogues* (pp. 259-275). Springer International Publishing.
- Harris, N., Hartwell, B., Thomas, L., & Grace, M. (2025). How can nature connectedness and behaviours for learning be deliberately developed in children, adolescents and young adults? A systematic literature review. *Child and Adolescent Mental Health*, 30, 168 - 185. <https://doi.org/10.1111/camh.12774>.
- Heft, H. (2013). Environment, cognition, and culture: Reconsidering the cognitive map. *Journal of Environmental Psychology*, 33, 14-25. <https://doi.org/10.1016/j.jenvp.2012.09.002>
- Herrmann, P., Waxman, S., & Medin, D. (2010). Anthropocentrism is not the first step in children's reasoning about the natural world. *Proceedings of the National Academy of Sciences*, 107, 9979 - 9984. <https://doi.org/10.1073/pnas.1004440107>.
- Kahn, P. H. & Kellert S. R. (2002) *Children and nature: Psychological, sociocultural, and evolutionary investigations*. MIT Press.
- Kals, E., Schumacher, D., & Montada, L. (1999). Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior*, 31(2), 178-202. <https://doi.org/10.1177/00139169921972056>.
- Kalvaitis, D., & Monhardt, R. (2015). Children voice biophilia: The phenomenology of being in love with nature. *Journal of Sustainability Education*, 9(March), 1-15.
- Kaplan, R., & Herbert, E. (1987). Cultural and sub-cultural comparisons in preferences for natural settings. *Landscape and Urban Planning*, 14, 281-293. [https://doi.org/10.1016/0169-2046\(87\)90040-5](https://doi.org/10.1016/0169-2046(87)90040-5).
- Kellert, S. R. (2002). Experiencing nature: Affective, cognitive, and evaluative development in children. In P. H. Kahn & S. R. Kellert (Eds.), *Children and nature: Psychological, sociocultural, and evolutionary investigations* (pp. 117-151). MIT Press.
- Kokkonen, J., Engberg, E., Simonsen, N., Wackström, N., Ray, J., & Ray, C. (2022). Adult-Child Nature Visits Associate with 2- to 7-Year-Old Children's Nature Connectedness. *Ecopsychology*, 15, 193 - 203. <https://doi.org/10.1089/eco.2022.0061>.
- Kos, M., Jerman, J., Anžlovar, U., & Torkar, G. (2016). Preschool children's understanding of pro-environmental behaviours: Is it too hard for them?. *International Journal of Environmental and Science Education*, 11(12), 5554-5571. [no DOI]
- Li, Y., Zhao, Y., Huang, Q., Deng, J., Deng, X., & Li, J. (2024). Empathy with nature promotes pro-environmental attitudes in preschool children. *PsyCh Journal*, 13, 598 - 607. <https://doi.org/10.1002/pchj.735>.
- Mackay, C., & Schmitt, M. (2019). Do people who feel connected to nature do more to protect it? A meta-analysis. *Journal of Environmental Psychology*. <https://doi.org/10.1016/j.jenvp.2019.101323>.
- Malone, K. (2016). Reconsidering children's encounters with nature and place using posthumanism. *Australian Journal of Environmental Education*, 32(1), 42-56. <https://doi.org/10.1017/ae.2015.48>
- Martin, L., White, M., Hunt, A., Richardson, M., Pahl, S., & Burt, J. (2020). Nature contact, nature connectedness and associations with health, wellbeing and pro-environmental behaviours. *Journal of Environmental Psychology*. <https://doi.org/10.1016/j.jenvp.2020.101389>.

- Mayring, P. (2014). *Qualitative content analysis: Theoretical foundation, basic procedures and software solution*. https://www.ssoar.info/ssoar/bitstream/handle/document/39517/ssoar-2014-mayring-Qualitative_content_analysis_theoretical_foundation.pdf
- Mays, B., Seligman, R., & Medin, D. (2020). Cognition Beyond the Human: Cognitive Psychology and the New Animism. *Ethos*, 48, 50-73. <https://doi.org/10.1111/etho.12264>.
- Merewether, J. (2019). Listening with young children: enchanted animism of trees, rocks, clouds (and other things). *Pedagogy, Culture & Society*, 27, 233 - 250. <https://doi.org/10.1080/14681366.2018.1460617>.
- Milfont, T. L., & Schultz, P. W. (2016). Culture and the natural environment. *Current Opinion in Psychology*, 8, 194-199. <https://doi.org/10.1016/j.copsyc.2015.09.009>.
- Min, B., & Lee, J. (2006). Children's neighborhood place as a psychological and behavioral domain. *Journal of Environmental Psychology*, 26, 51-71. <https://doi.org/10.1016/j.jenvp.2006.04.003>.
- Miyamoto, Y., Nisbett, R., & Masuda, T. (2006). Culture and the Physical Environment. *Psychological Science*, 17, 113 - 119. <https://doi.org/10.1111/j.1467-9280.2006.01673.x>.
- Mohamed, D., Jadidi, N., AlZmammi, R., & Kandeel, M. (2022). Merging the child in nature: Towards the greening and afforestation project in light of the initiatives of Egypt and Saudi Arabia. *International Journal of Education in Mathematics, Science and Technology*. <https://doi.org/10.46328/ijemst.2607>.
- Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior*, 41(5), 715-740. <https://doi.org/10.1177/0013916508318748>.
- Norðdahl, K., & Jóhannesson, I. Á. (2020). 'Let's go outside': Icelandic teachers' views of using the outdoors. In S. Waite (Ed.), *Outdoor learning research*, 1st Ed. (pp. 60-75). Routledge.
- Norðdahl, K., & Jóhannesson, I. Á. (2015). Children's outdoor environment in Icelandic educational policy. *Scandinavian Journal of Educational Research*, 59(1), 1-23. <https://doi.org/10.1080/00313831.2013.821091>
- Norðdahl, K., & Einarsdóttir, J. (2014). Children's views and preferences regarding their outdoor environment. *Journal of Adventure Education & Outdoor Learning*, 15(2), 152-167. <https://doi.org/10.1080/14729679.2014.896746>
- Norðdahl, K., Pálmadóttir, H., Heggen, M. P., Jørgensen, N. J., Furu, A. C., Thulin, S., ... & Staffans, E. (2025). Early childhood education for sustainable development in the Nordic national curricula: Status and content. *Environmental Education Research*, 31(3), 648-660. <https://doi.org/10.1080/13504622.2024.2389945>
- Olivos-Jara, P., Segura-Fernández, R., Rubio-Pérez, C., & Felipe-García, B. (2020). Biophilia and biophobia as emotional attribution to nature in children of 5 years old. *Frontiers in Psychology*, 11, 511. <https://doi.org/10.3389/fpsyg.2020.00511>
- Orman, M., Wanless, S., Birgisdóttir, F., & Norðdahl, K. (2025). Enjoyment, empathy, and environmental behavior: A study of young children's nature connection in Iceland. *Journal of Cognition and Development*, 27, 67 - 92. <https://doi.org/10.1080/15248372.2025.2506044>.
- Otto, S., & Pensini, P. (2017). Nature-based environmental education of children: Environmental knowledge and connection to nature, together, are related to ecological behaviour. *Global Environmental Change*, 47, 88-94. <https://doi.org/10.1016/j.gloenvcha.2017.09.009>
- Parkinson, D. D. (2001). Securing trustworthy data from an interview situation with young children: Six integrated interview strategies. *Child Study Journal*, 31(3), 137-157.
- Passmore, H., Martin, L., Richardson, M., White, M., Hunt, A., & Pahl, S. (2020). Parental/guardians' connection to nature better predicts children's nature connectedness than visits or area-level characteristics. *Ecopsychology*, 13, 103 - 113. <https://doi.org/10.1089/eco.2020.0033>.
- Pellier, A.-S., Wells, J. A., Abram, N. K., Gaveau, D., & Meijaard, E. (2014). Through the eyes of children: Perceptions of environmental change in tropical forests. *PLoS ONE*, 9(8). <https://doi.org/10.1371/journal.pone.0103005>
- Procter, L. (2015). Children, nature and emotion: Exploring how children's emotional experiences of 'green' spaces shape their understandings of the natural world. In M. Blazek & P. Kraftl (Eds.), *Children's emotions in policy and practice: Mapping and making spaces of childhood* (pp. 221-241). Palgrave Macmillan UK.
- Profice, C. (2018). Nature as a living presence: Drawings by Tupinambá and New York children. *PLoS one*, 13(10), e0203870. <https://doi.org/10.1371/journal.pone.0203870>.

- Rasmussen, K. (2004). Places for Children – Children's Places. *Childhood*, 11, 155 - 173.
<https://doi.org/10.1177/0907568204043053>.
- Rice, C. S., & Torquati, J. C. (2013). Assessing connections between young children's affinity for nature and their experiences in natural outdoor settings in preschools. *Children, Youth and Environments*, 23(2), 78-102.
<https://dx.doi.org/10.1353/cye.2013.0051>.
- Richardson, M., Dobson, J., Abson, D., Lumber, R., Hunt, A., Young, R., & Moorhouse, B. (2020). Applying the pathways to nature connectedness at a societal scale: A leverage points perspective. *Ecosystems and People*, 16, 387 - 401. <https://doi.org/10.1080/26395916.2020.1844296>.
- Roczen, N., Kaiser, F. G., Bogner, F. X., & Wilson, M. (2014). A competence model for environmental education. *Environment and Behavior*, 46(8), 972-992.
<https://doi.org/10.1177/0013916513492416>
- Rogoff, B. (2003). *The cultural nature of human development*. Oxford University Press.
- Rosa, C., Profice, C., & Collado, S. (2018). Nature Experiences and Adults' Self-Reported Pro-environmental Behaviors: The Role of Connectedness to Nature and Childhood Nature Experiences. *Frontiers in Psychology*, 9. <https://doi.org/10.3389/fpsyg.2018.01055>.
- Sauli, S., Kosnin, A., & Ernst, J. (2025). The Impact of Nature Walks on Young Children Nature Connectedness: A Biophilia Hypothesis Analysis. *International Journal of Academic Research in Progressive Education and Development*. <https://doi.org/10.6007/ijarped/v14-i2/25514>.
- Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology*, 21(4), 327-339.
<https://doi.org/10.1006/jevp.2001.0227>.
- Schultz, P. W. (2000). New environmental theories: Empathizing with nature: The effects of perspective taking on concern for environmental issues. *Journal of social issues*, 56(3), 391-406. <https://doi.org/10.1111/0022-4537.00174>
- Severson, R., & Lemm, K. (2016). Kids see human too: Adapting an individual differences measure of anthropomorphism for a child sample. *Journal of Cognition and Development*, 17, 122 - 141.
<https://doi.org/10.1080/15248372.2014.989445>.
- Severson, R., & Woodard, S. (2018). Imagining others' minds: The positive relation between children's role play and anthropomorphism. *Frontiers in Psychology*, 9. <https://doi.org/10.3389/fpsyg.2018.02140>.
- Shekari, F., Azizi, F., & Ghaderi, Z. (2024). Adults' pro-environmental behaviours and childhood experiences: the mediating role of nature connectedness, psychological ownership, and environmental knowledge. *Current Issues in Tourism*, 27, 3849 - 3865. <https://doi.org/10.1080/13683500.2024.2316859>.
- Sihvonen, P., Lappalainen, R., Herranen, J., & Aksela, M. (2024). Promoting Sustainability Together with Parents in Early Childhood Education. *Education Sciences*. <https://doi.org/10.3390/educsci14050541>.
- Smedsrud, T., Kleppe, R., Lenes, R., & Moser, T. (2023). Early childhood teachers' support of children's play in nature-based outdoor spaces: A systematic review. *Education Sciences*. <https://doi.org/10.3390/educsci14010013>.
- Smith, C. P., Feld, S. C., & Franz, C. E. (1992). Methodological considerations: Steps in research employing content analysis systems. In C. P. Smith, J. W. Atkinson, D. C. McClelland, & J. Veroff (Eds.), *Motivation and personality: Handbook of thematic content analysis* (pp. 515–536). Cambridge University Press.
- Sobel, D. (1996). *Beyond ecophobia: Reclaiming the heart in nature education* (Vol. 1). Orion Society.
- Sobko, T., Jia, Z., & Brown, G. (2018). Measuring connectedness to nature in preschool children in an urban setting and its relation to psychological functioning. *PloS One*, 13(11), 1-17.
<https://doi.org/10.1371/journal.pone.0207057>.
- Soga, M., Evans, M. J., Yamanoi, T., Fukano, Y., Tsuchiya, K., Koyanagi, T. F., & Kanai, T. (2020). How can we mitigate against increasing biophobia among children during the extinction of experience?. *Biological Conservation*, 242, 108420. <https://doi.org/10.1016/j.biocon.2020.108420>.
- Tillmann, S., Tobin, D., Avison, W., & Gilliland, J. (2018). Mental health benefits of interactions with nature in children and teenagers: a systematic review. *Journal of Epidemiology and Community Health*, 72, 958 - 966.
<https://doi.org/10.1136/jech-2018-210436>.
- Uram, P., Skalski-Bednars, S., & Kwiatkowska, A. (2025). The green connection: The relationship between connection with nature and pro-environmental attitudes, behavior, and well-being of young adults in Poland – A longitudinal study. *Polish Psychological Bulletin*. <https://doi.org/10.24425/ppb.2025.153977>.

- Wan, E. W., & Chen, R. P. (2021). Anthropomorphism and object attachment. *Current Opinion in Psychology*, 39, 88-93. <https://doi.org/10.1016/j.copsyc.2020.08.009>
- Wang, P., Yang, W., Wang, D., & He, Y. (2021). Insights into public visual behaviors through eye-tracking tests: A study based on National Park System pilot area landscapes. *Land*. <https://doi.org/10.3390/land10050497>.
- Wells, N. M., & Lekies, K. S. (2006). Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments*, 16(1), 1-24. <https://dx.doi.org/10.1353/cye.2006.0031>.
- Whitburn, J., Linklater, W., & Abrahamse, W. (2020). Meta-analysis of human connection to nature and proenvironmental behavior. *Conservation Biology*, 34(1), 180-193. <https://doi.org/10.1111/cobi.13381>.
- Wünsche, T. U., Beery, T., & Fridberg, M. (2025). Children's perceptions of nature experiences from participating in a nature experience for nature connectedness intervention in Swedish school-age educate. *Journal of Adventure Education and Outdoor Learning*, 1-28. <https://doi.org/10.1080/14729679.2025.2608939>
- Yan, Q., Cai, Y., & Zeng, W. (2025). Driven by feelings or stimulated by context: how childhood nature experience shaped adulthood pro-environmental behavior?. *Frontiers in Psychology*, 16. <https://doi.org/10.3389/fpsyg.2025.1529388>.
- Zhai, J., & Gao, J. (2024). Adapting and validating a game-based testing instrument for measuring nature connectedness in children. *Journal of Environmental Psychology*, 99, 102439. <https://doi.org/10.1016/j.jenvp.2024.102439>

Appendix A

The NC-DTT (Nature connectedness Draw-and-Tell Task) Protocol

1. Protocol for Drawing Task (Teacher)
 - a. Provide the child with a blank piece of paper, crayons and/or colored pencils. Ask the child: "Can you draw yourself while doing something in nature?"
 - b. *Note for teacher:* It is important not to make any suggestions about what "nature" is or what they might be doing in nature, but to give the child the opportunity to show you what they think nature is.
2. Follow-up Interview Questions (Researcher)
 - a. What is in your drawing? (*label elements on drawing*)
 - b. What are you doing in your drawing?
 - c. Can you point to the nature in your drawing?
 - d. Who is in your drawing? (*label people on drawing*)
 - e. Where is this happening? (At home, in school, somewhere else?)
 - f. What do you hear in nature?
 - g. What do you want to touch in the nature?
 - h. Do you like to study nature? Why?
 - i. Is the nature here clean or dirty? How does this make you feel?
 - j. Are there other people you like to be in nature with besides who is in your drawing? Who else do you like to be with in nature? Why do you like to be in nature with them?
 - k. How does the nature make you feel? Why does it make you feel this way?
 - l. Are you friends with the nature? Why or why not?
 - m. Are you fond of nature? Why or why not?
 - n. Do you feel like you are a part of nature? Why or why not?
 - o. Do you feel scared or calm in nature? Why or why not?

Appendix B



Figure 1. Example drawing from the Nature Connectedness Draw-and-Tell Task (NC-DTT), with objects labeled by the child and recorded by the research assistant.



Figure 2. Example drawing from the Nature Connectedness Draw-and-Tell Task (NC-DTT), with objects labeled by the child and recorded by the research assistant. An "X" indicates the element the child identified as nature.



Figure 3. Example drawing from the Nature Connectedness Draw-and-Tell Task (NC-DTT), with objects labeled by the child and recorded by the research assistant. An “X” indicates the element the child identified as nature.

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Children Drawing World-care in Denmark Early Care and Education (ECEC): Findings and Implications

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ABSTRACT

This paper reports from a study exploring how 4–5-year-old children, who participated in World-care practices in ECEC in Denmark, experienced our common worlds and what to care for, as they articulate these experiences in drawing interviews. The World-care practices were developed in an 18-month participatory practice research project with early childhood educators in 11 ECEC facilities in Denmark. We apply an eco-feminist worldview considering common worlds and caring ethics as critical alternatives to learning about nature as if we are separate from ‘nature’. Analytically we integrate body-phenomenology conceptions of embodied inter- and intra-affectivity with cultural psychology conceptions of activity and symbolic tools, that guide attention to our common worlds in practice. In that lens we explore ideas of caring for our common worlds articulated by children participating in project World-care. 70 4–5 year-olds participated in drawing interviews and articulated more connectedness, diverse and specific experiences about who and what to care for in our common worlds after 18 months with World-care pedagogy practices than before. This finding we consider to document the children’s affectionate awareness and understanding of our common worlds to include a place-based sense of connectedness, potential self-awareness and caring agency. Early childhood educators’ approaches in practice are pivotal for such development; it is demanding work and there is still a long way to go toward more sustainable World-caring pedagogies.

Keywords: World-care pedagogies, Early Childhood Education, Children drawing experiences, Caring Ethics

Research has called for green transition and more sustainable ways of living, producing and consuming for years (Brundtland, 1987). Yet only recently sustainability and green transition have become part of the curriculum of Danish Early Childhood Education and Care (ECEC), and it still plays a peripheral role (IPCC, 2022/2023, Norðdahl et al. 2024). Children are constantly introduced to cultural understandings and symbolic worldviews, in ECEC and at home, in ways that form their sense of responsibility and kinship with other living organisms, animal-beings and their habitats. It is during early life that children first encounter the cultural distinction between nature and culture, humans and other animals, and form attitudes towards the natural environment, hierarchies between living creatures, practices and values of fairness, solidarity and justice.

According to Huggins & Evans (2018) the growing body of literature about early childhood education and sustainability from different theoretical and methodological perspectives has come to a new stage and identified areas that need further research. Among them are processes of children’s active learning and participation as co-researchers in more sustainable practices. The new stage of research is challenging the existing anthropocentric position in the western world by integrating alternative conceptualizations, among them post-humanist theories and indigenous worldviews. In this line of thought an increased awareness of the unsustainable current situation challenges romanticized ideas in ECEC of innocent children playing in a healthy nature (Elliott and Young, 2016). For ECEC professionals such increased awareness and the issue of climate change and eco-crises comes with a potential high price of anxiety and hopelessness (Wals, 2017). It is difficult to avoid anxiety and hopelessness for educators

who are mindful of the threats, and eager to help children and contribute to solving their problems (Macias & Ribera, 2020). Many adults – parents and educators alike – shut their eyes and avoid the problems of climate change and loss of biodiversity, rather than engage with them, as a response to the uncertainty and anxiousness connected to the issue (Scoffham & Rawlinson, 2022, Roepstorff 2022). We struggled with this explicitly in project World-care: a three-year long researcher- and ECEC practitioner collaborative project for developing a new sustainability pedagogy based on care ethics (Tronto 1993; Winther-Lindqvist et al., 2025). In this article we focus on how children 3-5 express World-care as they articulate their experiences in drawings and dialogues.

The World-care project is based on a life-philosophical, phenomenology and cultural psychological ontology, implying human needs as biologically based and socio-culturally produced in human communities reflecting changing norms and ideals (Fuchs, 2011; Løgstrup, 1993; Vygotsky, 1998). Those ideals become internalized and psychologically active as motives (Bozhovitz, 2009), and experienced and embodied as personal and individual (Fuchs, 2017; Vygotsky, 1998). Pedagogy for sustainability and green transition in ECEC is important as ‘it is in the early years that many fundamental attitudes towards the environment, towards consumption and waste and towards fairness and social justice are formed’ (Siraj-Blatchford, 2018, p. xv).

A key challenge for the adult educators (professionals, researchers and parents) in the participatory research project was: How can we embody more sustainable worldviews, choices, attitudes, and habits, and engage children in caring and protective ways on this agenda in a society and system which is inherently unsustainable? Behind this choice was a wish to avoid creating eco-anxiety and despair without romanticizing children and nature (Kelsey, 2014).

In other publications we have investigated how educators (professionals and parents) can work within a World-caring approach to enable a more sustainable ethics and practice as identification figures for children today (Winther-Lindqvist et al 2025, 2026a, Kousholt & Winther-Lindqvist, 2026b). We describe how becoming more caring involves identification of dilemmas, resources and barriers for practising green transition in early years education. Several psychological defences such as splitting (where climate disaster is either regarded as exaggerated or unavoidable), momentary denial, and a need for transforming the scope of worry and threat into something we can act upon, appear to be part of the process of adapting to our present situation (Winther-Lindqvist et al, in print). The professional ECEC-participants in the World-care project demonstrated various ways to transform habits and ideas about limiting use of resources into caring creative explorations of alternatives in practice (for example to reuse materials for drawing and playing, or to redefine what Christmas or Easter decorations could look like depending on resources available, changing the diet to local and seasonal fruits etc.). We have worked with the “educators’ own depth of environmental understandings and pedagogical repertoire in order to fully explore an ethic of partnership with nature through a sustainability lens” (Elliot and Young, 2016, p. 60). Elliot and Young suggest an eco-feminist-based worldview considering *Common worlds* to be a conceptual frame to promote reimagining of the pervasive hierarchies of human/nature dualism; it is about bringing together and re-entangling humans and nature within nature cultures that acknowledge the multiplicities of living, to not only blur the boundaries that categorize nature and culture, but to see, relate and act differently”. (Elliot & Young, 2016, p. 60). We chose this critical alternative to the ‘learning about nature’ approach, which presupposes that we are separate from ‘nature’, and that learning necessarily leads to caring and a changed perception of our co-dependency with the ecosystem. The history of the Western world shows clearly that the way we have ‘known’ about nature and natural phenomena have been used to exploit and destroy other forms of life and their habitats, because this way of knowing was not integrated with care (Care Collective, 2020). This is also empirically supported by research showing that more learning about nature has not resulted in more sustainable practices or lifestyles (Wals, 2017).

Project background

We applied different research methods to involve educators and children in the World-care project. The overall methodology is a collaborative research approach, and with educators we organised Research Circles (RC) (Holmstrand & Härnsten 1995; Holmstrand 1997). In our study RC included the manager and one or two educators from each facility in groups with 12-18 participants together with two researchers, who facilitated discussions, knowledge building, and reflections. Each of the seven RCs lasted three hours organised by researchers with a presentation round of practices from facilities, a 30 minute thematic presentation of knowledge about caring domains, our own relationship to the climate emergency, dilemmas etc. The practitioners provided insights from

practice and documentation such as photos and descriptions of World-caring practices with children in facilities (see more in Winther-Lindqvist et al 2026b, in print). This methodology of RC aim to study, develop, inspire and qualify practice and therefore emphasize participants' contributions to and reflections about their practice.

To investigate how young children in the World-care project perceive of our common world, including who and what they think is important to care about and take care of, we chose drawing interviews in groups of 3-5 children, as we anticipated this methodology would be un-intrusive and yet illustrative. We hypothesized that the RC's and a quite intensive collaborative research project among their educators would influence practice in the ECEC facility enough to show in the ways children articulate their relationship to natural phenomena and other living creatures in their ideas and drawings. This article reports on our positive findings on that question: the children indeed showed more differentiated understandings of our common worlds, in the form of local places and animals encountered in those, in the second round of drawing interviews, than in the first round of interviews at the onset of the project. Also, we found the drawing interview methodology helpful to explore children's perceptions and understandings of care and who to care for in unintrusive ways. This article thus presents selected findings on the analysis of children's drawings and discuss the methodology of drawing interviews as a way of engaging children in careful ways to the sustainability agenda in education.

Theory and design

We applied several theoretical resources in the World-care project and in the analysis of children's drawings. In the participating children's and adults' articulations of lived embodied experiences, ideas and understandings of various forms of life and what to care for and care about, we expected to identify "Common worlds" as conceptualized in the eco-feminist approach. The body-phenomenology tradition contributes with conceptions of lived embodied experiences and their meanings for a person's affections, values, emotions and understanding, not only as reflective knowledge, but also as pre-reflective unarticulated body-knowledge showing in habits and immediate responses (Merleau-Ponty 2014, Fuchs 2011, 2017). The cultural-historical tradition provides conceptions to analyze how children develop motives through pedagogical activities and relationships because of participating in pedagogical activity settings, communicating ideas, values and understandings mediated by shared symbolic systems such as language and procedures in practice (Leontjev 1994; Vygotsky 1986; Chaiklin 2001).

Even though these traditions differ in many aspects they also share basic ontological ideas such as body-material experiences and development intersecting with sociocultural and material structures, practices and mediating means (Køster & Winther-Lindqvist 2018, Hedegaard 2025). We consider it fruitful to integrate these conceptual frameworks to study how the ECEC practitioners in project World-care practiced seeing, relating and acting differently in our common world in everyday life, as Elliott & Young (2016, p. 60) asked for (Kolmos et al., 2025; Winther-Lindqvist et al, 2025). In this article we apply these conceptual frameworks in the study of children's ideas of what to care about and care for before and after they participated in the World-care practices in ECEC.

Drawing interviews with young children

Drawing as a research strategy with young children is a recognized methodology and in recent years more used in combination with interviews and storytelling to account for children's learning especially in the STEM area (Parkes 2025). In a recent literature review Parkes describes how children's drawings demonstrate the power of drawing as representation as well as documentation for assessing children's increased understanding of scientific concepts and phenomena. We wanted to study how children in the World-care project experienced care and what to care for in our world and we wondered if they would present an increased understanding of their connectedness and care for other animals and natural phenomena in their drawings after the World-care project. Children aged 4-5 years may not have clear verbal definitions of their experiences of 'care', but they have rich experiences and felt sensations of being cared for and taking care of and may be able to express this more vividly in the combination of a verbal and a graphic activity like the drawing interview. In a phenomenology lens, felt sensations and experiences of care are engrained in our pre-reflexive body memory as *"the totality of implicit dispositions of perception and behavior mediated by the body and sedimented in the course of earlier experiences."* (Fuchs, 2011, p. 86). To study 4–5-year-

old's lived experiences and implicit ideas of care, drawings can be viewed as a personal, symbolic, body-sensory and perceptual articulation of experience.

Research into young children's drawings

Research on children's drawings presents general characteristics that deserve attention when using drawings as part of research. Young children (2-3 years) mostly draw very simple visual graphics such as lines, arcs, zigzags and circles (Goodnow 1978; Havskov Jensen, 1986; Lowenfeld & Brittain, 1972). Based on an extensive literature review Stamatopoulou (2010) empirically studied scribbling in a 14-31 months old boy focusing on his emerging ability to symbolic coordination - for example the dynamic dual action of motor schema in scribbling and the "perceptual event" of perceiving form outlined in the scribbling trace. Gradually it will "stand" for a possible symbolic object" (Stamatopoulou 2010, p. 5 / l. 496-499). The study illustrated how scribbling as an interactive turn-taking with an attentive caregiver was foundational for the child's experiences of agential trace-making and *"facilitates the child's ability to form self-reflective intentionality, which is critical for the symbolic-imaginary transformation of objects in symbolic communication"* (Stamatopoulou 2010, p. 25). Scribbling and graphic trace-making in interactive turn-taking thus appears foundational for children's drawing abilities and graphic traces present children's situated affections and engagement.

Between 2 and 5 years of age huge developmental fertility in children's drawing abilities are described in the literature (Köhler & Pedersen, 1978). This was confirmed by the developmental art researcher Antonio Machón who characterized four distinctive forms of representation in a dataset of 2177 drawings (Machón, 2013): Beginning by the age of 2.03 children's drawings are 'Grapho-motor representation' similar to traces of moving drawing implements, by the age of 3 years 'Graphic-symbolic representation' begins, as children label their drawings to represent something else than the graphic lines. By the age of 3.09 years 'Idiographic representation' begins, as children use specific graphic forms to represent certain symbolic meaning even though there is little visual resemblance with the defined motif (from an adult perspective). Not until children are 4-5 years old is it common to find in their drawings what Machon labelled 'Figurative representations' that visually resemble the defined motifs and/or established symbols, icons and schemas to represent the defined motifs. In Machon's material boys appeared to begin any of the new forms of representation a couple of months later than girls.

The 4-5 year olds are also found to increasingly define what they will draw before they begin and be open to redefine the motif if the drawing turns out to differ from what they initially intended or it reminds the child of something else (Hansson et al. 1991). From this age onwards, it is common in children's drawings to find anthropomorphic representations, for example the sun or the house with a smiling face (Hansson et al. 1991). When children intend to draw something specific, the drawings tend to present the child's experience and/or knowledge in visual form, which can then be observed, be shared in verbal and give rise to reflections – by the drawing child as well as others (Köhler & Pedersen 1978). With age and increased experience children are found to draw more realistically (Eng, 1926, 1957, 1961). In our multimedia culture most children from a very young age have multiple experiences with the cultural representations of our world, and these representations strongly influence and inspire children's drawings (Köhler & Pedersen 1978, Nielsen, 2012). Drawing activity is characterized as visual articulation and communication, and from the youngest age, children observe and communicate with others when drawing, and the atmosphere and relationships strongly influence the drawing activity and development of the children (Braswell & Callanen 2003, Boyatsis & Albertini 2000, Köhler & Pedersen 1978). Combining drawing and interviews in groups of children who know each other has significant advantages: as they can verbalize and provide explanations to their drawings (Berti & Cigala). They also take inspiration from each other with regards to their choice of motif, color and overall theme (Cox 2005). Girls and boys appear to be mostly inspired by same gender peers and gender-specific cultural images, and cultural changes regarding gender are reflected in children's drawings across time (Longobardi et al., 2022; Nielsen 1993; Boyatsis & Albertini 2000). The 2-4 year olds often draw similar human figures, sun, sky, rain, their house, plants and diverse animals, whilst older children articulate more gendered differences in the form of cultural icons and clichés in their drawings (Nielsen 2012).

Integrating drawing research with the specific study on World-care

Based on this literature we expected the youngest participants in the World-care study to scribble graphic structures and potentially define emerging motifs and the older participants to define their intended motifs before and while drawing. We expected scribbled and other graphic structures to articulate situated embodied affectivity and emotional engagement of the drawing children, that needed triangulation with other articulations such as speech and body gestures to be understandable to us. We expected to see gender differences and to find common cultural symbols and icons presenting our 'natural' lifeworld such as soil, sky, sun, or rain in the drawings.

Knowledge about children's drawings support the phenomenology-based approach to embodied affectivity of trace-making, interaction in turn-taking, scribble and coloring (Fuchs 2017; Stamatopoulou 2010). According to cultural psychology Vygotsky (1997) argued that children's drawings should be considered as unique speech and as a graphic narration of their thinking (Parkes 2025). In this tradition the practical and symbolic tools are fundamental mediating means for the development of children's psychological functions, including their attention, perception, intentionality, and agency (Vygotsky & Luria, 1930). Drawing interviews invited the children to act with practical tools (crayons, marker pen and paper) and with symbolic tools (words in speech and representations/motifs in drawings). The drawing implements offered potentials for articulation in unity with children's direct experiences with their lifeworld, drawing, and their mediated experiences: images, narratives and other representations. Together, these units inspire and form the child's perception, drawing activity and related ideas (Köhler & Pedersen 1978).

The integrated phenomenology-based and cultural psychology-based approaches in the present study provided theory and terminology to describe and conceptualize how lived experiences and embodied inter- and intra-affectivity with 'care' were articulated in children's drawings and dialogues. Pre-reflexively the feeling body mediates and communicates affectivity as the affective affordances of the situation triggers a bodily resonance, influences the emotional perception of the situation and implies a corresponding expression and action readiness, in a continuing interactive cycle (Fuchs, 2017, p. 197).

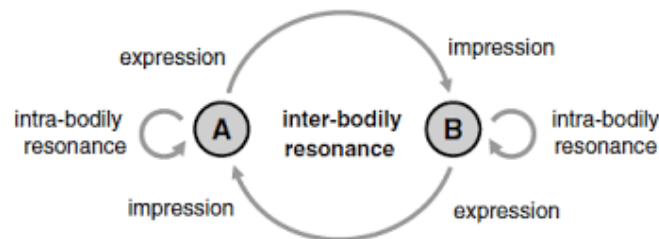


Fig. 1 – Inter-bodily resonance illustrated by Fuchs, 2017, p. 197.

Research Design and Data Material

The drawing interviews were conducted with 33 children in spring 2023 and with 37 children in autumn 2024 (70 children in total). To conduct research with young children requires a special sensitivity to create a safe situation and one where the child becomes confident enough to express and articulate her/his views and experiences. To feel safe in a familiar context and experience the privilege of choice to actively participate in articulation and narration of experiences to an interested listener is crucial for children in research settings (Honig og Nealis, 2012). We therefore organized the drawing interviews in groups of 3-4 children who were also friends or mates from the same unit in ECEC. Typically, the interviews lasted 45-50 minutes. Most groups were accompanied by an educator known to the children to the interview setting, who also assisted each child to find a seat and asked if they were comfortable before the educator left the room. On a few occasions the educator stayed, once because a child was very shy and only wanted to stay if she could sit right next to the teacher (who she also chose to draw in her drawing), twice because the teacher had the opportunity to be able to stay and was personally interested in drawing with children.

We asked open questions, such as ‘what weather do you know’ and ‘where do you like to play’ and followed up in line with what the children engaged with. If a child responded to know rainy weather, others often supplied and we would follow up asking how and where they liked to play in the sorts of weather. We invited for open dialogues and offered interested nonjudgmental comments such as: ‘You are using many colors’ – inviting responses from children after utterances such as: ‘Blue!’ or ‘I am drawing grass’. Our follow-up could be elaborating the theme introduced by the child: ‘What other plants do you know?’ Or mirroring such as ‘Grass?’ The children in groups typically elaborated on the themes introduced by each other in drawings as well as dialogue – see Fig 3 in Content analysis.

This open and wondering visual-interview-dialogue valued the children’s authentic ideas and voices as we did our best to abstain from evaluating and knowing better than the children. In all groups the children engaged in exploring and telling us about what they knew about our world – the weather, animals, plants, loved ones, what and who to care for and how to do it.

The first round of drawing interviews was conducted *before* the first RC were held in the 11 ECEC facilities, so prior to any World-care pedagogies. The second round of drawing interviews took place after the last RC rounding up the project with the educators in the facilities, thus at a point where they were well into experimenting and developing their World-care pedagogies (autumn 2024). We chose not to follow the same children, partly because we did not intend to evaluate specific children’s trajectory as outcomes of the study, but also because 1.5 years is too decisive a factor in drawing development for the comparisons between pre- and post-rounds to make sense because of the World-care pedagogies. Instead, we chose children, of the same age, prior to and at the end of the project period. The participating facilities display a socio-economically diverse population in the two areas, so we carefully chose facilities representing this diversity of both high- and low socio-economic status among the families in the municipality. What we intended to study was how children experienced their relations to the world and World-care, and as such how World-care pedagogies might impact children’s ideas of care and their potential caring agency. We therefore explored how 4–5-year-old children, from mixed socio-economic backgrounds, experienced our common world and what to care for, as they could articulate these experiences in drawings and dialogues in drawing interviews.

Procedure

In all facilities the sessions took place in a room separate from the other children, such as a meeting room or the craft-studio. Some children entered the room silently and appeared reluctant in the beginning, and as they engaged in experimenting with drawing implements and dialogues with the researchers and friends, they grew more confident. In other groups the children arrived after other activities and were in conversation when entering the room. The two female researchers introduced ourselves and the audio-recorder to the children at the onset of each interview and asked the children permission to record our meeting. All children accepted and the recorder was placed at the table beside the color boxes. The interview continued with the children presenting themselves with name and age followed by our invitation for them to explore the drawing implements. Each child received a piece of A3-size heavy high-quality water-color paper, and access to a box with 200 differently colored marker pens with a thin and thick end, and 25 oil pastels to choose from. The children reached out for the materials and appeared eager to start using them. We invited them to make a drawing about where they liked to play, what weather they would like to play in. Later we asked them who they care about and how we can care well for each other, and we asked them to draw someone they care about. Depending on what the children drew and brought into the conversation, we followed up and interviewed them around what appeared to be relevant: various favored activities, relationships, food, toys, creatures and places. We asked again what sort of animals and plants they knew of, what the animals they knew about would like to eat, and what they liked to eat themselves. Therefore, the interviews started out with roughly the same sort of questions, but ultimately the conversations and topics covered were very different. At first, we tried to direct the children towards weather phenomena, but as many of them without any verbal prompting would draw sky, sun, rain and clouds all by themselves, we decided on a very open-ended approach to get the children started and overcome shyness and reluctance to talk to strangers. We were more interested in creating a situation where the children felt inclined to express themselves in their drawings and speech in a good spirit, than directing them in the same direction.

Some children worked meticulously on a single drawing during the entire interview while others produced two, and some even three drawings. No children appeared to pay attention to the audio-recorder or to be affected by the recording, except when they had to move the recorder to get a specific color. The drawings were carefully photographed by the end of the session, one photo of the drawing and another photo with a post-it on it containing the name and age of the child and some hints about what the child told us it should depict. The photo session at the end also served as a good way of ending the drawing-interview with the children, as they appeared proud of having their drawings acknowledged in a photo.

Each session lasted 30-40 minutes and the audio-recording was later digitally transcribed and then listened through while reading by a researcher correcting text if not correct. The material then in total consists of 20 interview sessions, with 70 children who produced 99 drawings – 45 drawings in the first round (spring 2023) and 54 drawings in the second round (autumn 2024) – see fig. 2.

Ethics

The educators in the chosen facilities were gatekeepers for us in attaining informed consent by the parents to the children. The parents already knew about the World-care project, and most were giving their consent to our investigation. In addition to the formal informed consent obtained by the children's parents we also gained assent in the moment as the children entered the room, and we were mindful to make sure the children had good experiences with our encounter. The children were generally eager to use the materials and happy with the opportunity to draw in a calm atmosphere of a small group. And they were even happier with the attention they received from us on their drawings. The questions and comments we made to the children and their responses indicate to us that there is a big potential in taking children's drawings seriously as a pedagogical activity, and that children find it very motivating and stimulating with this attention. The children engaged with fidelity and openness in dialogues around their own drawings with us and became very happy with their drawings. Therefore, we decided that the children should be allowed to choose one of their drawings to bring home and keep it.

Analysis in numbers and overview

In 2023 most participants were 4 years old (16 girls and 13 boys), a few were 5 years old (two girls and one boy) and a single girl was 3 years. In 2024 this was almost reversed for participating girls with only five aged 4 and 13 aged 5 – and again a single aged 3. That year three boys were aged 3 years, nine were aged 4, and 6 aged 5 (see fig. 2).

Fig. 2: Drawing interviews	2023	2024	Total	Drawings (gender/age 3+4+5)
ECEC facilities / sessions	The Flower / 3 sess The Acre / 3 sess The Farm / 3 sess	The Valley / 3 sess The Fruit / 4 sess The Farm / 2 sess		
Sessions	9	11	20	
Participants	33	37	70	
Girls	19	19	38	52
3 years	1	1		2023: 1 + 18 + 4
4 years	16	5		2024: 4 + 8 + 17
5 years	2	13		
Boys	14	18	32	47
3 years	0	3		2023: 0 + 20 + 2
4 years	13	9		2024: 7 + 10 + 8
5 years	1	6		
Drawings				99

Content analysis

Children's drawings are not easy to interpret or understand in and of themselves, and the dialogues between the children and the researchers serve as important clues to what the images depict and what the child's intentions are in the drawings – similar to interpretations of other sorts of visual materials (Hansson 1991, Kleeberg-Niepage & Degen 2023; Nielsen 2013; Rose, 2007). We therefore relied on our post-its from the photo-sessions, and listened to the recorded dialogues to support our observations in the interview situation and our interpretation of the drawings focusing on the following steps:

- I. What can we describe in the drawings?
- II. What can we identify as representing something?
- III. What can we identify as the thematic experiences articulated in drawing interviews?
- IV. What is the context for the drawing including the dialogues and atmosphere in the group setting at the time of the drawing?

This strategy for analysis is inspired by prior research that analyzed drawings (Kleeberg-Niepage & Degen 2023, Nielsen 2012, 2014, 2018), and could play out as illustrated in Fig. 3:

Fig. 3 – A drawing interview in 2023		
		
Drawing A	Drawing B	Drawing C
I. What can we describe in the drawings? - Blue lines on top of paper /Yellow circles with rays/Blue, green and brown circles/ Mixed colors – engaged embodied affectivity		
II. What can we identify as representing something? - Blue lines: sky, rain, yellow circles and rays: sun, blue, green and brown circles: blue eyes and green/brown footprints of my dog (The children defined it this way and if one child in group had identified these signs/symbols, other children often began to use the same drawing procedure as described in the 'context' step of analysis).		
III. What can we identify as the thematic experiences articulated in drawing interviews? - In these examples we identified lived experiences of activities and their world: playing in rainy and sunny weather, walking my dog.		
IV. What is the context for the drawing? In this group of three 4-year-olds there was a calm, listening atmosphere of interest. We began asking about what weather they knew, and it had been raining - outside the window the sky was grey. The drawing dialogues emerged as follows:		
Ina declared she would draw 'sun' and she drew a yellow circle with rays and then rapidly colored a blue 'sky' – and looked astonished at the then greeny sun.		

Carlo declared he would draw thunder and he drew a couple of blue lines on top of paper, defined it as 'sky'	
Rose declared she would draw rain and began to draw blue lines on top of her paper.	
Carlo drew a circle beneath the lines, said: I will draw a man – this is his eye! He drew another eye and a mouth – and green and brown circles, he defined them to be 'footprints of my dog.' The dog is scared by thunder. A little conversation about what weather they liked, sunny was the best, Ina said she was drawing grass. Asked about other plants they might know Rose said 'flowers'. Ina drew flowers in the grass (Drawing A)	
Rose looked at Inas 'sun' and she drew one beneath the 'rain-lines' – and she looked at Carlos 'mouth' and she rapidly drew a mouthshape and meticulously colored it mixing red and white. She said with astonishment: 'it turns pink!!!' We asked Rose about the mouthshape – what is it? Rose explained it was the sandbox-meeting where everyone in facility gather together to plan who will tidy up what at the playground by the end of the day. The arcs on the sides are tree stumps to sit on:	
Ina asked for a new papersheet and rapidly colored blue lines at top and then mixed black and white to grey: 'It is smoke from a bonfire!'	
Carlo asked for a new paper sheet and colored blue lines for rain and blue circles: 'rain poodles to play in at the playground' Conversation about animals they knew beside Carlo's dog, they mentioned cats, rabbits, sheep, sharks and cows, they eat grass – and flowers. Sharks eat human flesh.	
Carlo asked for a new paper sheet and he drew a large yellow circle and many lines from it: the sun! The contextual process analysis adds knowledge about <i>how the children enter the drawing interview, how they acknowledge their own and peers' articulation and ideas</i> as they become inspired and continue to draw vividly engaged and tell us and each other about their ideas. This part of analysis adds knowledge about <i>how they experience rainy and sunny weather to play in</i> – in the sandbox with	

peers and adults who want them to join boring activities of tidying up. Also experiences with bonfire in the meadow and walking my dog appear as important for these children in this drawing interview before the World-care pedagogy, and tell us something they care about: dog, play, peers, sandbox, rain-poodles, and the adults organizing 'our life-world in facility'. These children mention very few plants, and they mention animals of which some are common pets in DK (dog, cat, rabbit), others are domestic (cow, sheep) and the shark is exotic. All these animals are common in literature, cartoons etc. for children.	
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Describing articulations

Like in the drawing development literature: age, gender, experiences with spoken language and prior drawing experience influenced the children's styles of participation and articulation. The youngest (3-4-year-olds) immersed in coloring the surface of their paper sheets, some of them hardly spoke and seemed absorbed in coloring. Their answers to our questions were largely just single words, such as from this excerpt:

Researcher A looks Carl (4) in the eyes and asks: *And you are using?*

Carl: *Blue.*

Researcher D: *What is your favorite color?*

Carl: *Green.*

Researcher A: *And yours, Ash?*

Ash (4): *Green.*

Bea (3): *Me too!*

Researcher A to Bea: *Oh, how interesting - what is appearing there?*

Bea: *Blue!*

Some of the 4-year-olds and 5-year-olds entered the drawing interviews with more confidence and explained to us that they knew the kind of drawing implements we supplied from their home or other places, such as Granny's place. In those situations, we used the information to enter conversations about how they felt about drawing with these implements at these places. This way, the drawing implements opened for conversations about important relations in the children's everyday lives. In other groups the children, in response to our questions could tell us about what we should care for and draw it for us, initializing conversation about how to draw something the questions brought to their minds.

The youngest participants engaged in drawing before defining their motives in contrast to the older participants who declared the motive to come and then wondered about how to articulate it. Often the motif changed through the drawing process no matter the age of the child, and these changes appeared to be inspired by the drawings of the other children as well as the conversation. The youngest participants engaged in scribbling and often it was not obvious how the drawing represented something else than colors, lines and graphic structures like circles, squares etc. The older children exhibited combinations of various graphic schemas to represent for example a human figure or a plant with a circle on top, some lines for body or trunk etc. The drawing interviews confirmed the age-related drawing styles and processes we could expect based on the literature and provided spoken and drawn articulations by the participating children as they in groups related to us researchers, to the questions we asked; to the drawing implements and to the situation and relationships with peers involved in each session.

Identifying representations

To identify representations articulated in the drawing interviews we translated the children's visual and spoken articulations to descriptive categories such as 'Natural phenomena', 'Plants' etc. These categories are our best attempts to identify and compare what is represented in the drawing interviews in 2023 and 2024. In addition, this method offers potential to compare with other studies using similar methods (Eraktas et al. 2025). The identified representations are listed in Fig. 3.

Fig. 3: Motifs / gender	Natural phenomena - Girls
Spring 2023	Sky – Sun – Rain – Snow – Rainbow - Vulcano
Fall 2024	Sky – Sun – Clouds - Stars - Rainbow – The Sea
	Natural phenomena - Boys
Spring 2023	Sky – Sun – Rain – Snow – Stars - Thunder – Lightning
Fall 2024	Sky – Sun – Rainbow - The Sea – Lake - Rain
	Plants - Girls
2023	Flowers (for bees and butterflies) – Grass (for cows)
2024	Nettles – Flowers / Heart-shaped flowers / Flower-friend – Grass – Tree -
	Plants - Boys
2023	Trees – Fruit-plants – Greenhouse
2024	Green leaves – Tree
	Family/Other Persons - Girls
2023	Babies - Siblings – MOM – Parents
2024	Siblings – MOM – Mom and me – My Family - Girl at 12 going to party -
	Family/Other Persons - Boys
2023	Babies - Siblings – DAD – Parents
2024	Siblings – DAD – Parents – Big brother with band-aid on knee and yoyo - Rabbit-killing man – Woman with rock-hair and pink ears -
	Animals - Girls
2023	Lion, Giraffe, Elephant, Ladybird, Cat, Spider, Slug with house, Centipede, Horse, Unicorn
2024	Butterfly - Lemonbutterfly – Ladybird – Bird – Dog – Rabbit - Cat – Hamster-kitten - Fox – Slug – Woodlouse – Pillbug – Grasshopper -Frog/Meat-eating Frog – Shark - Octopus – Owl-teddy – Ostrich/Stork –Baby-Worm/Mom-Worm – Crocodile – Wolf with big belly
	Animals - Boys
2023	Dog - Crocodile - Shark - Parrot – Crab – Slug with house and naked / mucus
2024	Slug – Tentacles - Worm – long tongue/many eyes – Rabbit - Turtle – Blue-whale-head – Octopus – Killer-slug
	Places - Girls
2023	Playground – Bonfire
2024	My House/Home – My Room – My Farm – My terraced house – path to my house
	Places - Boys
2023	Playground
2024	My house – My room – Jail – Lazer-Jail – Path – Scout-cabin
	Things - Girls
2023	Cellphone for mom – Barbie-house
2024	Furniture – Diamond-lamp – Pearls – Shoes – Airplane - Balloon – Lollipop – Popcorn -
	Things - Boys
2023	Guns – Knives – Racetrack – Rollercoaster
2024	My Teddy – Teddy-frog - Me and family in Boat – in Car – jumping Trampoline – yoyo played by big brother – Spike-table – Knives – Gun – Coffee-brewer – Cranes – Submarine - Statue
	Fantasy - Girls
2023	Hearts – Aliens
2024	Hearts - One-eyed Monster –
	Fantasy - Boys
2023	Monsters – Monster with heart in mouth – Submarine-race
2024	Monster

The identified motifs and the relational and socio-cultural interplays related to age and gender in the World-care drawing interviews and contexts are similar to what we would expect based on the literature (see section: Drawing interviews with young children) and described in section Content analysis and Describing articulations. Therefore, we don't explore age and gender variations or relational and contextual interactions further in this article. Instead, we focus on characteristics in the thematic experiences articulating common worlds in drawing interviews in spring 2023, when project World-care began, compared to fall 2024 following 18 months of more World-caring pedagogies. Our analysis is based on phenomenology conceptions including embodied lived experience, pre-reflexive intra- and inter-embodied affectivity, and on cultural-psychological conceptions.

Results

Thematic experiences articulated in the drawing interviews 2023 and 2024

Both girls and boys drew weather and other natural phenomena motifs: including sun, blue sky, stars, rain and rainbows. Also, children's chosen images were inspired by recent experiences, so in spring 2023, not long after a cold winter with snow, snow was a theme, and in fall 2024 not long after a warm summer with swimming in the sea and lakes, these appeared in drawings and dialogues. Only boys focused on thunder and lightning in dialogues and drawings. One girl said she had seen a volcano on vacation abroad.

Gendered differences appeared as girls included more flowers and grass as food for bees, butterflies and cows in spring 2023 while boys included trees, plants with fruits and a greenhouse. In fall 2024 the girls specified nettles which they encountered as food for the butterflies they bred in several facilities and symbols for friendship and love with flowers, and boys specified leaves from trees.

Articulations of family and important people to care for included babies, small children, all siblings, parents, the entire family and friends in articulations in 2023 and 2024 by both genders, the main difference occurred to be girls focusing on MOM while boys were focusing on DAD. In 2024 both genders included more specification of persons with specific characters, such as 'Mom in blue dress', 'Girl aged 12 dressed up for party' (Girls), and 'Big brother with band-aid on knee and yoyo', 'Rabbit-killer-man', and 'Woman with rock-hair and pink ears' (Boys). The specifications in 2024 may relate to the project activities focusing on care and including dialogues with children about how we care for ourselves and each other, and who they care about and trusted to care for them. Overall, the children talked about their parents and siblings, selected early childhood educators and that we as humans should care for small animals.

Both girls and boys included animals, and in the first round (2023) several exotic animals were mentioned: Lion, Giraffe, Elephant were mentioned by girls, and Crocodile, Shark, Parrot by boys. Also, animals experienced in their everyday lives were mentioned: Cat, Spider, Slug with house, Centipede, Horse, Unicorn by girls, and Dog, Crab and Slug with house or naked with mucus by boys. In 2024 especially the girls articulated a much more specified knowledge about animals as they included Butterfly, Lemon-butterfly, Ladybird, Bird, Dog, Rabbit, Cat, Hamster-kitten, Fox, Slug, Woodlouse, Pillbug, Grasshopper, Frog/Meat-eating Frog, Shark, Octopus, Owl-teddy, Ostrich/Stork, Baby-Worm/Mom-Worm, Crocodile and Wolf with big belly. The boys also mentioned more specific animals, but not as varied: Slug, Tentacles, Worm, long tongue/many eyes, Rabbit, Turtle, Blue-whale-head, Octopus, Killer-slug (illustration in Fig. 4).

Places mentioned become more diverse and specified after the project: In 2023 several children mention the playground as they talk about activities and places in their everyday and where they experience being cared for or caring for others. One girl mentions a bonfire. In 2024 many children mention and draw their homes and specify in detail the kind of housing and how their rooms are organized, sometimes with a pet. Only boys in 2024 also mention and draw 'a jail' or 'lazer-jail'.

Things mentioned in 2023 are relatively sparse: a 'Cellphone for mom' and 'Barbie-house' by girls and 'Guns, Knives, Racetrack and a Rollercoaster' by boys. In 2024 the variation is larger: Girls mention and draw 'Furniture – Diamond-

lamp, Pearls, Shoes, Airplane, Balloon, Lollipop, and Popcorn’, and boys mention and draw ‘My Teddy – Teddy-frog - Me and family in *Boat*, in *Car*, jumping *Trampoline*, *yoyo* played by big brother, Spike-table, Knives, Gun, Coffee-brewer, Cranes, Submarine, and Statue’.

The category Fantasy could be very large as many of the visual articulations are defined by the drawing children as different things during the drawing process. When a drawing presents an animal that transforms to become another animal, the figure is categorized as ‘animal’ and the different animal definitions appear in that category. Similar for mix of symbols such as ‘heart’ with ‘plant’ – a ‘heart-plant’ is categorized as a plant. That leaves quite few figures for the category ‘fantasy’ in which we include a symbol like ‘the heart’. In the fantasy category for 2023 the girls mentioned and drew Hearts and Aliens, while the boys included Monsters, a Monster with heart in mouth, and a Submarine-race. In 2024 it was quite similar, the girls included Hearts, and a One-eyed Monster, and the boys included Monsters.

Differences articulated in the category ‘Nature phenomena’ may relate to the children’s lived experiences in their everyday lives in the preceding weeks before the drawing interviews. While sky, sun, rain and stars reoccur all year; experiencing snow only happens in Denmark during the winter, sometimes as late as March. Snow appeared in spring 2023 as well as many drawings of rainy weather after a few months with many rainy days. Going to the beach or lake to swim is a summer experience, and the sea and lake were mentioned in fall 2024. In addition, both genders mention these phenomena in respectively 2023/2024.

Differences in the children’s drawings between 2023 and 2024 are characterized by larger diversity and specification in the second round within especially the categories of Animals and Places; therefore, we dive deeper into these in the following selected results.

Selected Results: Animals

The Animal category in the pre and post sample shows most significant changes. In 2023 children present exotic animals such as Lion, Elephant, Crocodile, that they are introduced to through symbolic resources like books, movies, posters, TV programs, toys and clothing (Kolmos, Nielsen, Skyggebjerg, 2025; Cole & Stewart 2016). The category also includes animals with which children have lived experiences, such as Dog, Cat, Spider, and Slug. In the second round (2024) the children draw and specified many more animals they have encountered in their everyday lives: Rabbit, Woodlouse, Pill-bug, Frog etc. We take this addition as a result of the World-care project, since it very clearly reflects the transformation described by the educators as their way of approaching more World-caring practices (Winther-Lindqvist et al. 2025, Winther-Lindqvist et al. 2026, forthcoming). Gender differences still appeared clearly as girls and boys respectively use sociocultural mediating means in speech and drawing to emphasize specific characteristics or interpretations of animals such as power, strength, action and potential danger in boys’ drawings and cute, nice, pretty and friendliness in girls’ drawings (Nielsen, 1994).

Fig. 4 Animals and gender	
‘Girl-motifs’: Cute, friendly and nice – such as small/cute creatures including butterflies, baby siblings, grasshopper, fox, nice flowers and rainbows, bright sun and hearts/heart-flower	‘Boy-motifs’: Power, action and strength – such as weapons, knives, forceful color-traces, spike-table, killer-slug, and ‘myself’ with hands and fingers and larger than twin-brother on slug-with-house
2023 Girls	2023 Boys
2023 Girl, 4 years: A blue butterfly, flowers, a rainbow, sunshine and rain:	2023 Boy, 4 years: Black weapons and knives:

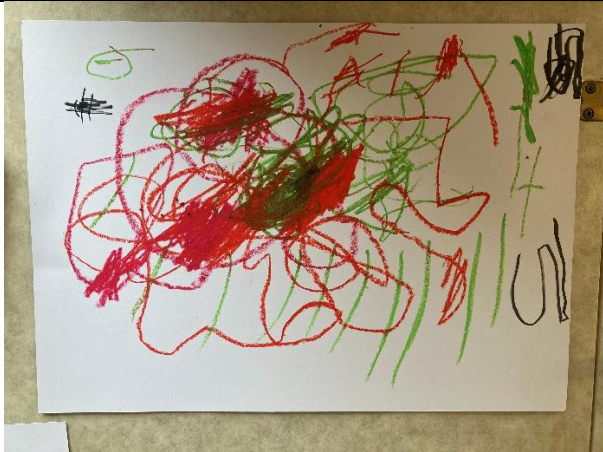


2023 Girl, 5 years:
A lion, a parrot, a zebra, a giraffe (jeg skal lige lytte for at identificere de to sidste)

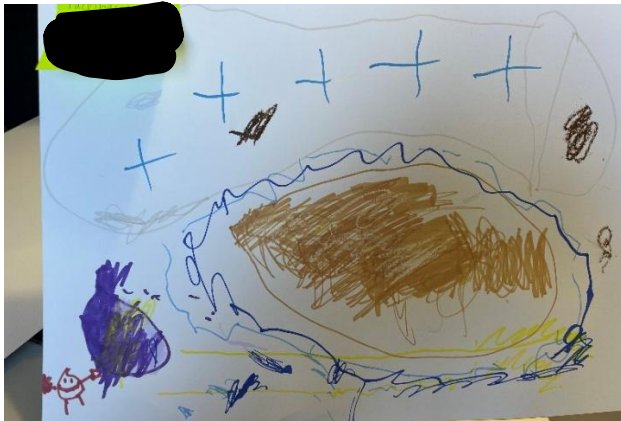


2024 Girls

2024 Girl, 4 years:
My baby sister (in center), a grasshopper, grass, flowers, the sun, a heart-flower and a blue fox.



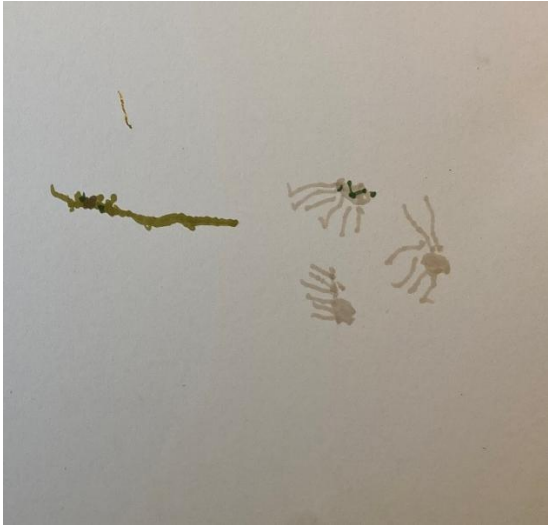
2023 Boy, 5 years:
A red crab, flowers, water, stars in grey sky, a racetrack and submarine-race



2024 Boys

2024 Boy, 4 years:
Myself (in center), a killer-slug, a blue spike-table, a slug with house and my younger twin-brother on top of it.



2024 Girl, 4 years: An earthworm and three pill-bugs with six legs each (even real pill-bugs have 14 legs). 	2024 Boy, 4 years: My teddybear (center), green leaves and trees. 
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Selected Results: creatures to care for

We consider the specifications of diverse creatures to care for (siblings, cuddling toys, animals and plants) related to World-care pedagogy and activities, as they focused on animals and their habitats, in the ECEC facilities playgrounds and natural environment in the neighborhood. These activities included for example to sow and water plants, breeding and caring for butterfly caterpillars and finding a good environment for setting the grown butterflies free, constructing insect-hotels at the playground and placing drinking water for bees and ponds for frogs. Caring for peers and oneself was part of the activities and included asking for comfort and sharing experiences with comforting cuddling toys such as 'teddys'. These activities were reflected in the children's drawings, articulating their lived experiences, and mediating means to label and specify the animals and how to care for them in more nuanced and differentiated ways in 2024 than in the first round of drawing interviews.

To care for each other, for friends, siblings, parents, and to need caring oneself was presented by the children in their drawings and stories about their families, homes, and favorite cuddling toy (my teddy-frog, my owl-teddy, my kitten, my rabbit). The World-care Pedagogies included activities with the 'Teddy-friend' from the national Danish anti-bully-program and provided a shared vocabulary for caring friendliness as everybody's need, shared motivation to care and to share strategies for care such as favorite cuddling toys.

Selected results: place

The Place category exhibit detailed specifications in 2024 presenting the children's homes including their ideas of caring for family members, pets and animals in the garden/the farm. Only boys represented jails, and one included a scout cabin. In 2023 the places were not specified – illustrations in Fig. 5

Fig. 5: Places and gender	
2023, Girls	2023, Boys
Girl, 4 years: Mom and me, a pink crab, flowers, stars and the sun	Boy, 4 years: A dad who turns into a waterfall (the blue), a tree with a ladder to a cabin in the tree and a tower, and a parrot



2024, Girls

Girl, 4 years: My hamsterkitten and flowerfriend in my room at home.



Girl 4 years: Mom in blue dress and our house



2024, Boys

Boy 4 years: My family at home with older brother with plaster on his knee playing yoyo beside dad, and my sister beside om in a nice dress, and me beside my brother.



Boy 4 years: Little brother and dad and mom and me on the ship to holiday.



We interpret these results as an indication of the World-care project, as activities included local group-walks in the nearby community and visits to the children's homes. Dialogues with people from the local community (librarians, workers etc.) engaged the children in reflections around their local area and town. These explorations we assume to have affected the children as embodied beings, supporting their awareness of potential other experiences than their own; including imagination about what it is like to live in another place, in another family situation and as another species.

The World-care activities provided richer sensuous lived experiences for children dealing with other forms of life, such as exploring the life of insects, spiders and pill bugs in caring approaches. The ECEC educators did their best to curiously and caringly inviting the children to explore these forms of life and thus – in a phenomenology lens - demonstrate inter-embodied affectivity in calm, confident and caring being-with other forms of life. Such inter-embodied resonance supports intra-affective conditions resonating with a calm, confident and caring being-with as lived experience in and of the participating children. Such lived experiences were supported by mediating means in language and activities, such as exploring what may be good life conditions for our butterflies.

In a cultural-psychological lens, specifications and details articulated in drawing interviews in 2024 present the children's acquired motivation to care for other forms of life and related new fields of attention to characteristics and to their own experiences of caring and being cared for. This way their lived pre-reflexive experiences and personal development of motives and fields of attention integrated with mediating means in activities and spoken language to certain approaches and potential agency relating to themselves, other people and other forms of life.

Discussion

We studied the conception "Common worlds" as children in drawing interviews articulated embodied experiences, ideas and understandings of various forms of life and what to care for. To describe and conceptualize how sensory-based experiences transform to significant ideas we applied the body-phenomenology conceptions of embodied inter- and intra-affectivity. We integrated the cultural psychology conceptions of activity and symbolic tools uniting to mediating means, that provide mental tools for attention and intentional orientation guided by significant meaning. In that lens we looked for significant meaning as ideas of caring for our common worlds articulated by the participants in project World-care. The articulated ideas about for what and whom to care and how implicitly presented the participants' framing of what they considered our "common worlds."

The children articulated more diverse and specific experiences and ideas about who and what to care for after 18 months with World-care pedagogy practices than before. In line with the cultural-psychological theory of development and the body-phenomenology theory of lived experiences we consider the more diverse and specific articulations in drawing interviews to document the children's affectionate awareness and understanding of our common worlds to include a place-based sense of connectedness and caring agency. To act caringly implies a sense of ability, being able to act as a subject encountering some-body and creating a certain change, a self-awareness of intentionality (Stamatopoulou 2010). They articulated the place-based sense of care in descriptions and drawings of 'my home,' 'our playground' and other places they like and/or have experienced as significant for themselves or animals. Similar place-based sense of connectedness appeared in their articulations of specific human beings. For examples, relations to family members and professional caretakers appeared frequently in the drawing interviews in both 2023 and 2024, however, they were presented with greater detail in 2024. Considering articulations of animals, pets and images of animals such as 'teddy' or other toys for comfort there were considerable differences. In 2023, drawing interview articulations of animals had many similarities with cultural images of animals in illustrated books, cartoons, movies and toys – mass-media images without variances coinciding with those in the children's drawings from 2023 to 2024. In 2024, the children's articulations of animals appeared more diverse and to a larger extent based on direct sensory lived experiences with specific animals. The 2024 articulations appeared to include place-based affection for these animals, such as the frog or woodlouse inhabiting certain parts of our shared playground and being somebody we care for by providing water. We consider such place-based experiences of connectedness to depend on children's opportunities to encounter and experience diversity in the natural environment as well as guiding caring approaches in the communities of practice in ECEC, in the family and larger community.

Young children's experiences and sensitivity to nature were found to relate to variations in the natural environment, the children's access to it and the guided understanding provided by educators (Eraktas et al., 2025). Eraktas et al. found that 89 5-6-year-olds in drawings and verbal explanations presented both universal developmental patterns and contextual variations shaped by the curriculum and the specific places and environments in which they lived. In the World-care study the 70 children participating were 1-2 years younger than in the study by Eraktas and colleagues.

Caring approaches and developmental implications

In early life, children learn by experiencing and imitating both parents and professional caregivers in activities and routines that form a basic habitual enculturation reflecting value positions often in pre-reflective, embodied and unarticulated ways (Nielsen, 2017; Køster & Winther-Lindqvist 2018). They see us when we step on the spider or the snail, or jump over it in order not to harm it - just as they see us when we provide drinking water to the butterflies on a hot summers day, which was one of the many World-care activities that participating facilities took up during the project. Animals and natural phenomena are everywhere around children in ECEC and found to evoke more empathic identification than plants (Mortari 2004). Yet the way animal images are presented to children in ECEC is mostly as exotic creatures (children in Denmark have hardly any real-life experiences with giraffes, crocodiles or polar bears). Quite bizarrely, the corner with animals contains a variety of animals mixed with imaginary figurines. It is common to have a basket full of life-stock figurines (sheep, pigs and cows), exotic animals (gorillas, bears, crocodiles), and fantasy or extinct animals (unicorns and dinosaurs) laying side by side. The exotic animals serve as iconic symbols and identification figures, where children are encouraged to dress up like a tiger or a bat and costumes are provided. Often different animals are connected to human personality traits and virtues: like the brave lion, the wise owl, the strong bear, and cute ladybird (Cassirer, 1999; Grønkjær 2005, Vedfelt 2012). Animals are often protagonists in children's books, paradoxically representing the human world of care, friendship, kindness, family life and other civilizing forces (Bryld & Lykke 2000, Gilliam & Gulløv 2012, Kolmos et al 2025). In short, the place for real animals, with real needs and lifeforms, and our own animality as humans (rather than animals' humanness) is less frequently addressed and stressed in cultural representation of animals to children in ECEC pedagogy, and clearly from the literature, this is a general issue in the western world (Cole & Stewart 2016).

We claim that the way images of nature and animals are presented to and introduced to children in Danish ECEC facilities, seems disconnected from issues of ethics or sustainability education in general. This may reflect a current situation where sustainability, green transition and human-nature relationships have not become an integrated topic or area of focus in pedagogy. This partly changed during the World-care project, due to the World-care pedagogy advocating caring for and with nature, rather than 'just' learning about it. The educators operationalized the World-care concept into a place-based and more sensitive attention to the animal and plant life surrounding them in the immediateness of their facility: the playground (especially), but also in the meadows, little creek, and small forest. Interestingly, this transformation of focus is also evident in the children's drawings of more places with importance to them, and places as homes or habitats for animals. Maybe testifying to a more reality-based, experienced relationship with the local animals present in their lives (their pets, local creatures and birds). This resembles a change in discourse we also detected among the educators. At the project onset, they talked about the playground as *their* playground where other creatures may cross it and visit, whereas at the end of the project a more cyclical and shared sense of ownership showed in utterances like: as soon as we have closed the facility in the evening, the playground becomes alive with its other inhabitants like the fox, the frogs.

Yet, despite these positive outcomes of the participatory action research project we find there is still a long way to go for ECEC pedagogy to become more world-caring and sustainable, especially in the ways that animals and nature are presented to children in ECEC-context as well as in mass-media images, that offer stereotypic schemes, ideas and discourses (Köhler & Pedersen, 1978). When it comes to animals as the exotic and distant "other" and the image of human cultural virtues is represented by animals acting like humans, the hyper-separation between humans and the rest of the natural world is reinforced rather than transgressed. Presenting animals only 'in our own image' and not in their own right, indirectly legitimizes an exploitative and ultimately colonial position towards other living creatures and nature (Plumwood 1993, 2002). The results of the World-care project show most clearly in pointing

towards becoming more aware of our own dependency on others and our shared places (Casey 2018). With this place-based awareness human life also reveals itself as dependent on the qualities of particular habitats and their conditions. This underlines our “animality” and shortens the distance between us and other animals, which is a first step in a less human-centred ethics (Dufourck 2022).

Summing up

The reflected practices, mediating means and intentions by which early childhood educators embody the ethics of connectedness with nature appear to lay the ground for children’s potential experiences of connectedness and caring agency in ECEC. It is demanding as usual habits and orientations, including romanticizing children in nature, need to be critically reflected in the communities of ECEC practitioners (Winther-Lindqvist et al. 2025). However, we found it possible to critically explore potential sustainable world-caring pedagogies by transcending the ordinary (mass-media-communicated) images of care and ‘other living beings’ and to begin exploring what it can be like to share our places with each other, including other living beings in our common worlds, together with children (Elliott & Young 2016; Kolmos et al. 2025).

In the drawing interviews children articulated their experiences and ideas about care and connectedness with others in common worlds. The World-care pedagogy offered participatory activities with potential for children to experience being worth caring for and being able to care for others and for our common worlds. The activities offered lived engagement and embodied inter- and intra-affectivity, mediated by the early childhood educators’ intentions and embodied actions and interactions with children, with each other and with other forms of life in their lived places such as the playground. It is demanding work and there is still a long way to go toward more sustainable world-caring pedagogies.

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References

- Berti S and Cigala A (2022) DRAW.IN.G.: A tool to explore children’s representation of the preschool environment. *Front. Psychol.* 13:1051406. doi: 10.3389/fpsyg.2022.1051406
- Bastrup-Madsen, L. (2001). “En dreng, der ikke må leve”. I P. Skogemann (red.), *Symbol, analyse, virkelighed*. København: Lindhardt & Ringhof.
- Boyatzis, C.J. og G. Albertini (2000). A Naturalistic Observation of Children Drawing: Peer Collaboration Processes and Influences in Children’s Art. *New Directions for Child and Adolescent Development*, nr. 90, vinter 2000. Jossey-Bass, a Wiley Company.
- Bozhovitz, L.I. (2009). The Social Situation of Child Development. *Journal of Russian and East European Psychology* (47), 59–86. DOI 10.2753/RPO1061-0405470403
- Braswell, G.S., K.S. Rosengren og S.L. Pierrousakos (2007). Task Constraints on Preschool Children’s Grip Configurations during Drawing. *Developmental Psychobiology*, DOI, 10.1002/ Wiley InterScience: www.interscience.com.
- Braswell, G. S. (2006). Sociocultural contexts for the early development of semiotic production. *Psychological Bulletin*, 132(6), 877–894. <https://doi.org/10.1037/0033-2909.132.6.877>
- Braswell, G.S. and Callanen, M.A. (2003). Learning to Draw Recognizable Graphic Representations during Mother-Child Interactions. *Merrill-Palmer Quarterly*, vol. 49, nr. 4, oktober 2003: 471-494. Wayne State University Press.
- Brundtland, G.H. (1987). *Our Common Future Report*. United Nations World Commission on Environment and Development.

- Bryld, M., & Lykke, N. (2000). *Cosmodolphins: Feminist Cultural Studies of Technology, Animals and the Sacred*. Zed Books.
- Casey, E. (2018). Place and Situation. In Schlitte, A. & Hünefeldt, T. (eds.). *Situatedness and Place: Multidisciplinary Perspectives on the Spatio-Temporal Contingency of Human Life*. Springer Verlag. Pp. 19-25.
- Cassirer, E. (1999). *Et essay om mennesket*. Hans Reitzels Forlag. (*An Essay on Man*, 1944, Yale University Press).
- Chaiklin, S. (2001). The institutionalisation of cultural–historical psychology as a multinational practice. In S. Chaiklin (Ed.), *The theory and practice of cultural– historical psychology* (pp. 15-34). Aarhus, Denmark: Aarhus University Press.
- Care Collective: Chatzidakis, A., Hakim, J., Littler, J., Rottenberg, C., & Segal, L. (2020). *The Care Manifesto*. Verso.
- Cole, M. & Stewart, K. (2016). *Our children and other Animals. The cultural construction of human-animal relations in childhood*. Routledge.
- Cox, S. (2005). Intention and meaning in young children's drawing. *International Journal of Art & Design Education*, 24(2), 115–125
- DMI – Danish Institute of Meteorology (2026)
- Dufourcq, A. (2022). *The imaginary of animals*. Routledge.
- Elliott, S. & Young, T. (2016). Nature by Default in Early Childhood Education for Sustainability. *Australian Journal of Environmental Education*, vol. 32(1), 57–64. doi 10.1017/ae.2015.44
- Eng, H. (1961). *Barne- og ungdomstegningens psykologi*. Oslo: Cappelen.
- Eraktaş, C.C., Güney, F., Cengiz, G.S.T. & Erol, D. (2025): The Colors of Nature and the Child's Mind: Representations of Nature in Preschool Children's Drawings, *Journal of Research in Childhood Education*, DOI: 10.1080/02568543.2025.2595100: <https://doi.org/10.1080/02568543.2025.2595100>
- Fisher, B. & Tronto, J. C. (1990). Toward a feminist theory of caring, in E.K. Abel and M. Nelson (Eds.). *Circles of care*, Albany, NY: SUNY Press
- Fuchs, T. (2011). Body Memory and the Unconscious. In D. Lohmar, D., J. Brudzinska (eds) (2011) *Founding Psychoanalysis. Phenomenological Theory of Subjectivity and the Psychoanalytical Experience*, pp. 69-82. Kluwer, Dordrecht.
- Fuchs, T. (2017). Intercorporeality and interaffectivity. *Phenomenology and Mind*, 11, 194–209. https://doi.org/10.13128/Phe_Mi-20119
- Goodnow, J. (1978) *Børn tegner*. Hans Reitzel.
- Gulløv, E., & Gilliam, L. (2012). *Civiliserende institutioner: Om idealer og distinktioner i opdragelse*. Aarhus University Press.
- Grønkjær, P. (2005). *Politikens bog om drømme*. Gyldendals Bogklubber.
- Hansson, H., Nordström, G.Z., Pedersen, K. & Stafseng, O. (1991). *Barns Bildspråk – Children's Pictorial Language*, Carlsson.
- Havskov Jensen, B. (1986) *Børns billeder*. Borgen.
- Hedegaard, M. (2019). Children's Perspectives and Institutional Practices as Keys in a Wholeness Approach to Children's Social Situations of Development. In A. Edwards, M. Fleer and L. Bøttcher (Eds.), *Cultural-historical approaches to studying learning and development: Societal, institutional and personal perspectives* (pp.23-41). Springer.
- Hedegaard, M. (2025). Taking Children Seriously: Their Emotional Experience, Imagination and Cognition—A Methodological Approach. In: Bøttcher, L., Winther-Lindqvist, D., Hedegaard, M., Fleer, M. (eds) *Sustainability, Care, Play and the Zone of Proximal Development. Perspectives in Cultural-Historical Research*, vol 15. Springer, Cham. https://doi.org/10.1007/978-3-031-92131-5_17
- Holmstrand, L. & Härnsten, G. (1995). How to bridge the gap between the school world and the world of university research. I T. Tydén (Red.) *When school meets science* (pp.122–145). Stockholm: HLS Förlag..
- Holmstrand, L. (1997). *Forskningscirklar som en plats för kunskapsmöten*. Vest, 10(3-4), 97–109. (in Swedish)
- Honig, A.S. & Nealis, A.L. (2012) What do young children dream about? *Early Child Development and Care*, 182:6, 771-795, DOI: 10.1080/03004430.2011.579797
- Huggins, V. & Evans, D. (Eds.) (2018) *Early Childhood Education and Care for Sustainability - International Perspectives*. Routledge. (Online).
- IPCC (2022) Sixth Report on [Climate Change 2022: Impacts, Adaptation and Vulnerability. \(ipcc.ch\)](https://www.ipcc.ch/report/sixth/)
- IPCC (2023) *Climate Change 2023 Synthesis Report*. [IPCC AR6 SYR LongerReport.pdf](https://www.ipcc.ch/report/synthesis/)

- Jensen, L.M. (2012). Triangulær terapi. Kunst og kærlig resonans i et triangulært felt. *Psyke & Logos*, 33/2: 361-384. København: Dansk Psykologisk Forlag.
- Jones, P. (2005) *The Arts Therapies* Brunner-Routledge.
- Kelsey, E. (2014). *Beyond Doom and Gloom*. Rachel Carson Center.
- Kleeberg-Niepage, A. & Degen, J.L. (2023) Children's Drawings as Data in Psychology. In: Tseliou, E., [Demuth](#), C., [Georgaca](#), E., & [Gough](#), B. (eds.) *The Routledge International Handbook of Innovative Qualitative Psychological Research*. Taylor & Francis Group.
- Kolmos, M., Skyggebjerg, A. K., & Nielsen, A. M. (2025). Children's literature as coupling point between global sustainability concerns and children's local agency. *Nordisk barnehageforskning*, 22(1), 86–105. <https://doi.org/10.23865/nbf.v22.594>
- Kousholt, D. & Winther-Lindqvist, D. (Submitted). We need to give our children tools – not fear. Parents' perspectives on World-care and upbringing for sustainability. *Contemporary Issues in Early Childhood*.
- Kragh-Müller, G. og R. Isbell (2011). Children's Perspectives on their Everyday Lives in Child Care in Two Cultures: Denmark and United States. *Early Childhood Education Journal*, vol. 39, nr.1. New York: Springer.
- Köhler, R. & Pedersen, K. (1978). *Børns billedproduktion i en billedkultur*. Ulrika.
- Køster, A., & Winther-Lindqvist, D. (2018). Personal history and historical selfhood: The embodied and pre-reflective dimension. In A. Rosa & J. Valsiner (Eds.), *The Cambridge handbook of sociocultural psychology* (2nd ed., pp. 538–555). Cambridge University Press. <https://doi.org/10.1017/9781316662229.029>
- Leont'ev, A. (1994). The development of voluntary attention in the child. In: R. van der Veer, & J. Valsiner (Eds.), *The Vygotsky Reader* (pp. 289-312). Oxford, UK: Blackwell Publishers.
- Lowenfeld, V. og W.L. Brittain (1972). *Kreativitet og vækst*. København: Gjellerup.
- Løgstrup, K. E. (1993). *Norm og spontanitet*. Gyldendal. (Danish language)
- Machón, A. (2013) *Children's Drawings – The Genesis and Nature of Graphic Representations. A Developmental Study*. Fibulas Publishers.
- Macias, G. & Ribera, D. (2020) School intervention – how to facilitate classroom meetings. In: Gerrard, B., Carter, M. & Ribera, D. *School-Based Family Counseling An Interdisciplinary Practitioner's Guide*. Routledge. 204-226
- Merleau-Ponty, M. (2014) *Phenomenology of Perception*, New York.
- Mortari, L. (2004). Educating to care. [EJ881766.pdf](#)
- Nielsen, A.M. (1994). *Køn og symbollag i børns billeder*. Ph.d.-afhandling. København: Danmarks Lærerhøjskole.
- [Nielsen, A. M.](#) (2012) *Børnetegninger som orienteringsspor og forskningsdata*, *Psyke & Logos*, 33, 2.
- [Nielsen, A. M.](#) (2013) Børnetegninger som forskningsmateriale. In Rasmussen, K. (Ed.) *Visuelle tilgange og metoder i tværfaglige pædagogiske studier*. Roskilde Universitetsforlag. Pp 115-146.
- [Nielsen, A. M.](#) (2014) How the researcher's experience of visual images can contribute to qualitative research. *Akademisk Kvarter/Academic Quarter*, 9, 175-187.
- [Nielsen, A. M.](#), (2017) *Børnetegning som æstetisk objekt I: Passepartout*, 20, 38, pp 205-233.
- [Nielsen, A. M.](#) (2018) *Artikulationsanalyse i fænomenologisk perspektiv*. I Bøttcher, L., Kousholt, D. & Winther-Lindqvist, D. (red.) *Kvalitative analyseprocesser: med eksempler fra det pædagogisk psykologiske felt*. [Samfundslitteratur](#).
- Nielsen, A. M., & Petersen, F. F. (2021). Affectivity and relational awareness in pedagogy and education. *International Review of Theoretical Psychologies*, 1(2), 135–153. <https://doi.org/10.7146/irtp.v1i2.128018>
- Nielsen, A. M., Winther-Lindqvist, D. & Kousholt, D. (2024) World-caring attitudes and practices for green transition and children's wellbeing in daycare in times of climate crisis. In N. Toren & C. Korzeniowski (Eds.). *Proceedings of the 2023 Oxford Symposium in School-Based Family Counseling*.
- Norðdahl, K., et al. (2024). Early childhood education for sustainable development in the Nordic national curricula: Status and content. *Environmental Education Research*, 31(3), 648–660. <https://doi.org/10.1080/13504622.2024.2389945>
- Parkes, M. (2025) *A Cultural-Historical Study of Fleer's Conceptual PlayWorld, Drawings and a Diorama: Creating Motivating Conditions for Preschoolers' Scientific Thinking*. PhD-thesis, Monash University, Faculty of Education.
- Pedersen, K. (1991): "Bo's billeder". I: Hansson, Nordström, Pedersen & Stafseng (eds.): *Barns Bildspråk – Children's Pictorial Language*, Carlsson.
- Pedersen, K. (1999). *Bo's Billedbog – en drengs billedmæssige socialisation*. København: Dansk Psykologisk Forlag.

- Plumwood, V. (1993). *Feminism and the mastery of nature*. Routledge.
- Plumwood, V. (2002). *Environmental culture: The ecological crisis of reason*. Routledge.
- Rose, G. (2007) *Visual Methodologies*. Sage.
- Roepstorff, S. (2022). *Klimapsykologi*. Peoples Press.
- Scoffham, S., & Rawlinson, S. (2022). *Sustainability education: A classroom guide*. Bloomsbury Publishing Plc.
- Siraj-Blatchford, J. (2018). Preface In V. Huggins & D. Evans (Eds.), *Early Childhood Education and Care for Sustainability. International Perspectives*. Routledge.
- Stamatopolou, D. (2010) "Symbol formation and the embodied self: A microgenetic case-study examination of the transition to symbolic communication in scribbling activities from 14 to 31 months of age", *New Ideas in Psychology* (2010), doi:10.1016/j.newideapsych.2010.09.001
- Tronto, J. (1993). *Moral boundaries – a political argument for an ethics of care*. Routledge
- Tronto, J. (1998). *An ethic of care*. *Generations*, 22(3), 15–20.
- Vedfelt, O. (2017). *A guide to the world of dreams*. Routledge.
- Vygotsky, L. S. (1986) *Thought and Language*. Cambridge.
- Vygotsky & Luria, 1930, UP, in Lev Vygotsky and Alexander Luria 1930: Tool and symbol in child development. Source: *The Vygotsky Reader*, edited by Jaan Valsiner and Rene van der Veer. [Tool and symbol in child development by Lev Vygotsky 1930](#)
- Wals, A. (2017). Sustainability by default: Co-creating care and relationality through early childhood education. *International Journal of Early Childhood*, 49, 155–164.
- Winther-Lindqvist, D. (2013). Playing with Social Identities: Play in the Everyday Life of a Peer Group in Day Care. In Schousboe & Winther-Lindqvist (eds.) *Children's Play and Development*, Springer, 29-54.
- Winther-Lindqvist, D.A. (2018). Personperspektiviske skift. I: Bøttcher, L.; Kousholt, D. & Winther-Lindqvist, D. (Eds.). *Kvalitative analyseprocesser* (pp. 41-62). Samfundslitteratur.
- Winther-Lindqvist, D. (2021). Caring well for children in ECEC from a wholeness approach – The role of moral imagination. *Learning, Culture and Social Interaction*, 30. <https://doi.org/10.1016/j.lcsi.2020.100452>
- Winther-Lindqvist, D. Kousholt, D. Kolmos, M. Nielsen, A.M. (2025) World-care Pedagogy: Sustainability in Early Years Education, in Bøttcher, L., Winther-Lindqvist, D., Hedegaard, M. & Fler, M. (eds.). *Sustainability, Care, Play and the Zone of Proximal Development: A developmental perspective on childhood and children's education*. Cham: [Springer](#), p. 117-141 24 p. (Perspectives in Cultural-Historical Research, Vol. 15).
- Winther-Lindqvist, D Nielsen, A.M. Kolmos, M. Kousholt, D. (2026a, forthcoming). A World-care pedagogy: How do care-takers face the challenge of inspiring, guiding and caring for children toward a more sustainable world? In, Tateo, L. Chimirri, N. & Bacigalupe, G. (eds.). *Cambridge Handbook of Psychology and the Planet: Environment, Climate Sustainability and Nature*. Cambridge University Press.
- Winther-Lindqvist, D. Josiasen, S. Kolmos, M. Nielsen, A. M. & Kousholt, D. (2026b, forthcoming) Research Circles on World-care in early years education – a participatory research approach, in *Qualitative Studies*.
- Ødegaard, E. (2021) Reimagining "Collaborative Exploration"—A Signature Pedagogy for Sustainability in Early Childhood Education and Care. *Sustainability* 2021, 13, 5139. <https://doi.org/10.3390/su13095139>

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Nature Preschools in Norway and the United States: Observed Similarities and Differences

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ABSTRACT

Growing interest in young children learning and interacting with others outside in a natural environment has contributed to a global increase in nature preschools, known as kindergartens in Norway. In these programs serving children aged 3-5, nature is the core feature. Identifying and understanding differences among nature preschools while simultaneously focusing on commonalities allows for learning from one another and sharing effective practices on an international scale. The purpose of this manuscript is to describe the organization, general characteristics, and time spent in natural settings at Norwegian and American nature preschools, as evidenced during observations. Data collected from a convenience sample of two nature preschools (one in each country) during four visits (two at each site) revealed more similarities than differences. Documenting common characteristics among international nature preschools is a necessary step toward establishing a universal definition that would improve communication and collaboration, supporting worldwide investigations into effective pedagogical practices in and the long-term effects of attending a nature preschool.

Keywords: preschool, nature, nature-based education, kindergarten, outdoor learning

Nature preschools have gained increasing popularity in the Nordic region, where they originated, as well as internationally. Two factors have likely contributed to the recent interest in nature preschools: a substantial and growing body of research that demonstrates contact with nature provides numerous benefits for physical and mental health (Sandifer et al., 2015), and children around the world are spending more time indoors compared to previous generations (Dealey & Stone, 2017; Gray, 2011). Recognizing that time outdoors is essential for children's overall health and well-being, there has been a global trend during the past twenty years to mitigate the negative impact of an indoor childhood by creating opportunities for children to connect with nature. The heightened appeal of nature preschool as an early childhood program is one result. In nature preschools, nature is the core feature. Children learn about, with, and through nature, with the natural world serving as the main setting for learning. Nature preschool fosters the development of the whole child while promoting respect and appreciation for nature through outdoor experiences across differing weather conditions and seasons.

A Brief History of Nature Preschool in Norway

In Norway, there are long-standing traditions of promoting outdoor activity, which is viewed as making people healthy and cheerful (Fasting, 2019). Nature preschools developed from Norwegians' high regard for spending time outdoors, known as *friluftsliv* or "open-air-life," beginning in the 1950s. Tom Murstad was a pioneer in this period, who used the tram to transport children from Oslo to small huts in the nearby hills of Holmenkollen because he wanted them to play in natural surroundings and experience nature. Until 1987, few Norwegian kindergartens

regularly used nature as the basis for teaching and learning. In the early 1990s, several kindergartens began using nature as a pedagogical foundation and adopted names such as nature kindergartens or open-air-life kindergartens to reflect this emphasis. Such kindergartens were first acknowledged by the government in 1999, at which time the number was stipulated at around 30. After the political kindergarten settlement in 2003, which agreed to the goal of full kindergarten coverage, the overall number of kindergartens in Norway increased significantly, and many nature kindergartens were established (Lysklett, 2013).

A Brief History of Nature Preschools in the United States

In the United States, the early beginnings of nature preschool were concentrated in the northern part of the country. The 1967 opening of a nature preschool at the New Canaan Nature Center in Connecticut, recognized as the first of its kind, was followed by the opening of the Massachusetts Audubon Arcadia Preschool in 1976 and Nature's Way Preschool at the Kalamazoo Nature Center in Michigan in 1982. As an educational trend, nature preschool in the United States experienced slow, gradual growth over its first fifty years, with approximately 20 nature preschools across the country in 2012 expanding to over 30 in 2014 (Bailie, 2012; Larimore, 2011). The idea of free play in nature as essential to children's healthy development gained significant momentum after the 2005 publication of Richard Louv's landmark book *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder*, criticizing the replacement of the unstructured, imaginative, and therapeutic outdoor explorations once common in the lives of American children with organized sports and restricted, sanitized, and limited play opportunities. By 2016, the number of nature preschools had swelled to over 150 (Merrick, 2016). As the number of nature preschools increased, interest among educators, parents, and the public also grew, making nature preschools a more accessible option for early childhood education to American families.

Nature Preschools Today

Today, greater recognition that outdoor play is essential to children's healthy development and well-being (Scott et al., 2022) has contributed to growing interest in young children learning and interacting with others outside in a natural environment. Both Norway and the United States have experienced a recent drastic increase in the number of nature preschools, which are known as kindergartens in Norway. In Norway, 97 % of children (3-5 years) attend kindergarten, and the kindergartens are highly subsidized. There are approximately 5200 kindergartens in Norway. About half of the kindergartens are private, and about half are operated by the local municipality. The adult-child ratio is set by the government at one adult to six children aged 3-5. In addition, there is a pedagogical norm that requires at least one educational leader per seven children under the age of three and one educational leader per 14 children over the age of three. Eighty-four percent of the nature kindergartens are private and have fewer children and staff than public kindergartens (Lysklett 2013). In 2024, there were 372 nature kindergartens in Norway, comprising 7% of all kindergartens (Utdanningsdirektoratet, 2024).

In the United States, the estimated number of nature preschools increased from 585 in 2020 to 800 in 2022, representing a 35% growth (North American Association for Environmental Education [NAAEE], 2023). Approximately 25,600 American children, mostly 3 to 6 years old, attended nature preschools during the 2022-2023 school year. Additionally, American nature preschools are spending a larger percentage of their school day outdoors compared to five years ago. California, Washington, and Minnesota have the largest numbers of nature preschools, while Maine, New Hampshire, and Vermont have the most nature preschools per capita. Licensing requirements in some states present a challenge to nature preschools, often resulting in them operating unlicensed with restricted hours, limited to the number of children they can serve, and without eligibility for public funding. Further, early childhood education teacher certification in most states spans pre-kindergarten through third grade, with pre-kindergarten serving 4-year-old children, and emphasizes preparation for teaching in traditional, indoor educational programs (Bouchrika, 2025). The Natural Start Alliance, founded in 2013 as a project of the North American Association for Environmental Education to support efforts connecting young children around the world with nature, advocates for improved licensing procedures for nature preschools and increased professional training for nature-based early educators (NAAEE, 2023).

Purpose and Procedures

Nature preschools, regardless of their location, share a philosophical stance that values young children's outdoor explorations as beneficial to their development and learning. Identifying and understanding differences among nature preschools while simultaneously focusing on commonalities allows for learning from one another and sharing effective practices on an international scale. The purpose of this manuscript is to provide basic but needed information about the differences and similarities between Norwegian and American nature preschools. Specifically, we address the following questions:

1. How are these preschools organized?
2. What are the characteristics of these preschools, particularly regarding time spent in natural environments?

Using a focused ethnography approach (Rashid et al., 2019), data was collected from a convenience sample of two nature preschools (one in Norway and one in the United States) during four observations (two at each site). Sites were purposefully selected from nature preschools within the two countries according to their accessibility and willingness to participate. Sites were visited on two non-consecutive, typical school days over seven weeks. Each observation lasted 4 to 5 hours. This was sufficient time to experience the various events and practices that comprise a normal day (e.g., arrival, opening activities, gathering procedures, lunch, free play, guidance techniques, and teaching situations) and to observe the entire time spent in the natural environment.

During visits, ordinary occurrences were witnessed and recorded, with particular attention given to engagement with nature. On several occasions, teachers were asked about what was being observed to obtain clarification or additional information. Digital photographs substantiated and, in some cases, augmented information obtained during observations. After each visit, notes were transcribed, and impressions were added. In this article, we describe the similarities and differences between Norwegian and American nature preschools regarding their organization, general characteristics, and time spent in natural settings, as evidenced during observations.

Findings and Discussion

Organization

Mission

Both preschools are ideally located for outdoor activities and engage children in learning about, with, and through nature, embracing the natural environment as their classroom. A shared philosophy of educating the whole child while cultivating a sense of wonder, love of learning, and environmental stewardship through play and child-led discovery is apparent in their mission statements, shown below:

Norway. Outdoor activities and active use of nature are the framework for educational activities. Nature is our most important arena for development, play, and learning.

United States. We believe nature is good for the body, mind, and spirit. Our students learn about the natural world through hands-on learning, creative play, and outdoor exploration.

Calendar

The nature preschools in this study followed the same general school year calendar used by public schools in their respective countries, operating from Monday to Friday from August to May. The Norwegian nature preschool had a school day schedule (7:00 a.m. - 4:30 p.m.), which was similar to that of traditional public schools in the area. The American nature preschool had a shorter school day (8:45 am - 12:45 pm) than traditional, public schools in the area, but offered before- and after-care options, which extended their hours to resemble the 7-hour schedule of nearby elementary schools. Both preschools scheduled days throughout the year for teacher planning.

At both preschools, children learn together in small, mixed-age groups, consisting of 12-14 children and two adults. This grouping is intended to mimic a familial situation, encourage community, promote collaborative learning, and create shared experiences. At the Norwegian nature preschool, children aged 3 to 6 were grouped, which made the age differences more apparent than at the American nature preschool, where 4- and 5-year-olds were grouped.

Staff

At both preschools, there was a lead teacher and an assistant teacher for each group. The Norwegian lead teacher was a pedagogical leader with a bachelor's degree in early childhood education. The American lead teacher had a bachelor's degree in early childhood, but not a state-issued teaching certificate. At both sites, assistant teachers were not required to have the same degree of formal training as lead teachers.

Historically, early childhood education has been a female-dominated profession. At the Norwegian preschool, both the lead and assistant for the group observed were males, with males comprising 50% (two out of four) of the teachers at the preschool visited. This percentage was higher than the national average in Norway, which is 11% for males in preschools (Utdanningsdirektoratet 2024) and 20% for males in nature preschools (Lysklett, 2013). All teachers (8) at the American nature preschool were female, which is not unusual given that men hold fewer than 3% of the preschool and kindergarten teaching positions in the United States (Reeves, 2024), with women accounting for an estimated 90.1% of the nature preschool workforce (NAAEE, 2023).

Characteristics

Broadly defined, nature preschools are early childhood programs that use nature as the heart of learning, with children spending time outdoors in natural environments every day. Lysklett (2005; 2014) and Berger (2013) identified six common characteristics of contemporary nature preschools in Norway: most are small; most are private; children spend a significant amount of time outdoors; various natural places are visited regularly; developing motor skills, social skills, and knowledge about nature is emphasized; and experiences in the natural environment are managed with a system of trust between the children and teachers. Nature preschools in the United States evidence these same characteristics to some extent.

Size and Funding

A recent study of nature preschools in the United States (Giles & Lysklett, under review) indicated that the majority (68.6%) served fewer than 50 children, and many (44.3%) served fewer than 20 children. These findings are consistent with those reported in a 2022 national survey of nature preschools, which found a median of 32 children per program (NAAEE, 2023). Both nature preschools observed in this study were small. The Norwegian preschool served 24 children, and the American preschool served 54 children. Both nature preschools observed also maintained a group size and teacher-child ratio below the allowable maximum in the United States, which is a group size of 20 with a teacher-child ratio of 1:10 (National Association for the Education of Young Children, 2018).

Although the Norwegian preschool in this study was public, most nature preschools in Norway are private. Almost all nature preschools in the United States operate with tuition, as opposed to being funded by any government entity (NAAEE, 2023). The American nature preschool in this study was fully tuition-funded with a scholarship assistance program to help local families in need meet the financial obligation.

Time Outdoors

The average percentage of the day spent outdoors during warm weather for Norwegian and American nature preschools is about 70% (Moser & Martinsen, 2015; NAAEE, 2023). The average amount of total time most American nature preschools spend outdoors per day is 4 hours for full-day programs and 3 hours for half-day programs (NAAEE, 2023). Observations at both locations exceeded these measures. Norwegian preschoolers were observed outside for approximately 5 hours per day (71%), and American preschoolers were observed outside for approximately 3.25 hours per day (81%). All observations, however, occurred during pleasant weather conditions. We acknowledge that

daily schedules must be adjusted to accommodate inclement weather, such as freezing temperatures, extreme heat, or thunderstorms, resulting in less time spent outdoors on some days.

While outside, children were observed in various activities. The Norwegian preschoolers played outside the classroom before and after traveling to the day's natural area. During this time, children rode bicycles, dug in the dirt pit, played chase, and engaged in dramatic play using a wooden car and fort located on the grounds. The American preschoolers engaged in teacher-led activities outdoors, like group discussion and counting activities, before traveling to the day's natural area, and they ended the day with individual, self-directed Montessori-style tasks indoors. At both preschools, children ate snacks and lunches outside.

At the Norwegian and American preschools in this study, children spent a significant part of each day interacting with nature. This included time spent hiking to/from natural areas and time engaged in free play at the natural area. Norwegian preschoolers spent 3 hours (43%) of their 7-hour school day engaged with nature. Approximately 1 hour of these 3 hours was devoted to travel and lunch. American preschoolers spent 1 hour (25%) of their 4-hour school day playing in a natural area, located 1-4 minutes away, before returning to the outdoor classroom area for lunch.

Visiting Natural Places

Norway. Taking daily trips or walks from the preschool to various natural places is a standard practice in Norway (Lysklett, 2014; Lysklett & Berger, 2017). These places, known as reference areas, are located from 225 meters to 3.64 kilometers from the preschool (Lysklett & Berger, 2017) and are used to increase physical and pedagogical possibilities (Lysklett, 2005; 2013). Some nature preschools make major modifications to the reference area to customize the space for children's use. This might involve creating a seating area, adding tables, erecting a tent-like shelter, or building a fire circle. In other instances, minimal or no changes are made. Minor changes to the reference area usually focus on improving safety and may include removing large rocks under climbing trees or pruning sharp branches from trees.

The Norwegian nature preschool in this study had 15 reference areas labeled with descriptive names to make them easily identifiable by the children. All 15 areas were within walking distance of the preschool. Observations occurred at two separate areas known as Viewpoint and Western Woods. On the second day of observation, the children were consulted when determining which area to visit. Improvements to the first area included the addition of a log swing suspended between two trees and a small lean-to shelter constructed of large limbs covered with leafy branches. The second area had a fire circle surrounded by large logs used for seating. These areas were reached by traversing a variety of different terrains. On the first day, travel to the Viewpoint was mostly uphill along narrow, uneven paths through underbrush. The path was dirt or mud in some places and wet and spongy moss-covered ground in other places. At one point, children walked across two wooden planks placed side-by-side to serve as a bridge over a small stream. To reach the Western Woods, children walked along a wide gravel trail for most of the distance before turning onto a smaller, well-defined wooded trail over mostly even ground. At the Norwegian preschool, travel from the preschool to the reference area lasted 20-30 minutes each way, and each child wore a backpack containing their lunch.

United States. Children attending American nature preschools spend their time outdoors exploring and playing in various natural settings located on the grounds of the preschool (Giles & Lusklett, under review). The various natural areas on a preschool's property are referred to as designated spaces to distinguish them from reference areas, which are typically located beyond the preschool's boundaries. The American nature preschool observed was situated on an 11-acre, mostly wooded property. A shallow creek flowing through the property was the main natural area for free play and exploration. The Creek, which remained completely unaltered, was entered at different points on different days for variation. In addition to the Creek, there were three other designated spaces. Observations occurred at the Creek and in a small clearing within the woods known as Mushroom Meadow. The proximity of these areas eliminated the need for children to carry their backpacks or lunches, which remained at the preschool's outdoor classroom. The well-worn path to the Creek was steep, narrow, and, in some places, muddy, requiring children to maneuver over exposed tree roots. Mushroom Meadow was reached by walking along a short, wooded trail over even ground.

Both. Paths traveled within and beyond the boundaries of the nature preschools were narrow, uneven, steep, rocky, and muddy in places. No children with mobility issues or other needs requiring accommodation were observed participating in the programs. Both preschools, however, seemed open to working with children of all abilities, expressing an “aim to serve a diverse community” (United States) using a “holistic model for inclusive practice” (Norway).

Curricular Emphasis

Norway. The Norwegian nature preschool observed emphasized the development of children’s physical and social skills along with knowledge about nature learned through direct, self-initiated contact. Children’s gross motor development was promoted through such observed activities as riding bikes, climbing trees, balancing on logs, running, navigating various topographies, and swinging. Fine motor skills were refined as children wrapped yarn around sticks, picked berries, and dug in the dirt. Children communicated, shared, and negotiated as part of their natural interactions with peers of various ages. Although some short-lived gender segregation was noted, boys and girls, young and old, routinely played together, talked to one another while walking, and held hands while in the group circle.

Children’s familiarity with nature was apparent in their interactions with their natural surroundings. Children knew about the environment, its animals, and its plants because it was where they lived and played, rather than something learned about through instruction. Their comfort with nature was observed as they confidently picked and ate wild blueberries and lingonberries from shrubs they passed without any adult direction or permission. Similarly, one boy picked and ate Ground Elder leaves, which he used as a topping on his mud pizza without any acknowledgment (either praise for his correct identification of an edible plant or redirection from picking and/or ingesting vegetation) by the teachers. When some children’s excited exclamations of “æsj” (or “ash”) alerted the teacher to their discovery of animal feces, the teacher joined their visual examination and accepted their recognition of it as “yucky.” This discovery, however, was not used as a teaching opportunity that involved hypothesizing about the type, size, or diets of animals in the area. Time spent outdoors emphasized children’s wonder, enjoyment, and appreciation of nature as opposed to their acquisition of factual knowledge or specific skills. No whole-group structured learning activities were observed.

United States. The American nature preschool observed emphasized the development of children’s physical, social, and cognitive skills, including academic and knowledge about nature. Children’s gross motor development was promoted through such observed activities as climbing low tree branches, crawling over or under exposed tree roots, and running. Children were observed using fine motor skills to dig clay from the creek bottom, wield sticks like swords, and collect leaves. Children shared ideas, space, and materials during dramatic play and communicated their wants and needs to both teachers and peers. A child’s discovery of a cicada shell prompted a reminder from the teacher of their recent insect study. Children engaged in teacher-directed activities aimed at increasing their knowledge of nature (leaf scavenger hunt), reading (letter matching), mathematics (counting sticks), and general knowledge (days of the week). Teachers made accommodations (placing a blanket for a child not wanting to sit directly on the ground) or offering alternate activities (color a picture) for children’s discomfort in natural settings. The traditional early childhood practice of a daily whole-group gathering (circle time) to foster listening skills and taking turns was observed. Teachers and children sat together to greet one another, sing songs, preview activities, and review expectations. Various teaching aids (i.e., calendar, alphabet chart) and consumable instructional materials (paper, pencils, and crayons) were incorporated in outdoor learning activities.

Both. At both preschools, conservation was taught through modeling. Norwegian children were given a reusable cup for water, while American children used a personal, refillable water bottle. At both sites, eliminating paper packaging and encouraging healthy eating habits were observed as children ate low-sugar, nutritious foods from reusable containers. At the American nature preschool, the need for paper towels at an outdoor sink was eliminated by encouraging children to shake their hands dry.

Management and Guidance Techniques

Norway. At the Norwegian preschool observed, experiences in the natural environment were managed with a system of trust between the children and teachers. This trust was based on a mutual understanding that the teacher would largely supervise without controlling behaviors and that a teacher's direction, when given, was to be immediately and fully followed. The expectation that children could act autonomously replaced the need for any rule other than to obey the teacher. This expectation was clearly communicated through actions rather than words. If a child stumbled and fell without injury, the teacher neither assisted the child in returning to their feet nor instructed the child to stand up and keep going. Unlike rules, which serve as restrictions on children's behaviors, set limits, and establish control, guidance techniques observed in Norway fostered independence and increased self-regulation. Children were observed dressing to go outdoors, playing outside, eating, and engaging with nature without adult intervention or assistance. Similarly, children were afforded a high degree of responsibility when traveling to the reference area, as they moved freely to designated waiting points. At the reference area, teachers did not formally indicate boundaries, and children were permitted freedom to wander beyond the immediate vicinity to explore or for privacy to relieve themselves in the woods without notifying a teacher. Children were granted a similarly high level of freedom in their play. They were observed using berry juice for face paint and engaging in weapon play without adult interference. Teachers accepted that children's free play in nature should be exciting and challenging, and they were comfortable with the possible perils inherent in this type of risky play.

United States. While the level of independence afforded at the American nature preschool exceeded that present in traditional American preschools, it did not meet the level observed in Norway. The overall rules, called "safety agreements," were explicitly taught and included the following: do your best; keep your hands to yourself; listen and respond to group calls; play nice, and stick together. Additionally, guidelines for specific natural areas were communicated upon arrival at the designated space. For example, the children were instructed not to splash in the creek unless they were in the 'splash zone' and reminded not to play with sticks taller than themselves while in the woods. Colorful bandanas were tied to tree branches to designate the play space. Children were verbally reminded to stay within the identified boundaries and never put nature in their mouths. After the same rough patch of ground resulted in one child stumbling and another falling, the teacher moved the bandana marking the perimeter, making the play space smaller to remove the rough patch of ground. When children were observed using stick guns to shoot one another as they played pirates, the teacher asked a series of questions that led the children to deduce that pirates were more likely to have swords than guns, replacing short, bent sticks with long, slender ones. The teacher then asked a few more questions that guided the children from pretending to sword fight to constructing a pirate ship with a plank.

Both. The Norwegian and American nature preschools encouraged the children's use of natural resources in their play. Toys and manufactured items (such as buckets, shovels, blocks, or balls) were not present in natural areas. Children used their hands to dig and their extended shirt bottoms to carry pinecones. Two children in Norway were observed picking large fern fronds and using them as wings when pretending to be crows. Norwegian and American preschoolers were observed using sticks as guns and swords during dramatic play.

Conclusion

The organization and general characteristics, including time spent in natural settings, of nature preschools in Norway and the United States have been briefly described, based on observations from a single example in each country. The similarities between these two examples outweigh the differences among them. The organization of daily activities and the percentage of time spent outdoors are largely the same, despite the difference in the length of their day. The unifying attribute seems to be their shared belief that experiences in and with nature are beneficial for young children. Nonetheless, there is a noticeably greater emphasis on academics, specifically literacy and mathematics, and a greater degree of teacher control in the American nature preschool as compared to the Norwegian nature preschool. The increased monitoring and protective type of adult interaction is a typical style of parenting and childcare in the United States, attributed to a culture filled with societal pressures to ensure children's school readiness, fear for mental (bullying) and physical (gun violence) safety at school, and a litigious tendency. A stronger description of the common characteristics among international nature preschools would be beneficial for

establishing a universal definition. Such a definition would improve communication and collaboration, supporting worldwide investigations into effective pedagogical practices in and the long-term effects of attending a nature preschool.

References

- Bailie, P. (2012). *Connecting children to nature: A multiple case study of nature center preschools*. [Doctoral dissertation, University of Maine-Farmington]. Digital Commons@University of Nebraska Lincoln.
- Berger, H. W. (2013). Organisering, uteaktivitet og innholdsformidling i naturbarnehager og andre barnehager (Organization, outdoor activities and dissemination of content in nature kindergartens and other kindergartens). Masteroppgave i førskolepedagogikk. Pedagogisk institutt, NTNU. NTNU: Trondheim.
- Bouchrika, I. (September 1, 2025). *Early Childhood Teaching Certification and Requirements for 2025*. Research.com. Retrieved from <https://research.com/careers/early-childhood-teaching-certification-and-requirements>
- Dealey, R. P., & Stone, M. H. (2017). Exploring out-of-school play and educational readiness. *Early Childhood Education Journal*, 46(2), 201–208. doi:10.1007/s10643-017-0849-7
- Fasting, M. L. (2019). Children's right to play: Outdoor play as tradition, and space for children to play in the Framework Plan for Kindergartens (pp 14-21). In M. L. Fasting (Ed.) *Playing Outdoors*. Scandinavian University Press.
- Gray, P. (2011). The decline of play and the rise of psychopathology in children and adolescents. *American Journal of Play*, 3, 443-463.
- Giles, R. M., & Lysklett, O. B. (under review). Where outdoor learning occurs: Reference areas in American nature preschools.
- Larimore, R. (2011). Nature-based preschools. A powerful partnership between early childhood and environmental education. *Legacy Magazine*, 22(3), 8-11.
- Louv, R. (2005). *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder*. Algonquin Books.
- Lysklett, O. B. (2005). Uteleik året rundt i kjente omgivelser [Outdoor all day]. In O. B. Lysklett (Ed.), *Ute hele dagen* (pp. 15-22). Trondheim: DMMH.
- Lysklett, O. B. (2013). *Ute hele uka. Natur- og friluftsbarnhagen*. (Out all week: The nature and open-air kindergarten). Universitetsforlaget. Retrieved from https://fess.ie/images/stories/ResourcesForTutors/Resource_Lists_Level_6/outdoor_and_nature_barneha_ge_Norway.pdf
- Lysklett, B. O. (2014). Nature preschools in Denmark, Sweden, Germany and Norway: Characteristics and differences (16 pp.). In T. Waller, E. Ärlemalm-Hagsér, E. B. Hansen Sandseter, L. Lee-Hammond, K. Lekies, S. Wyver (Eds.), *The Sage handbook of outdoor play and learning*. Sage. <https://doi.org/10.4135/9781526402028.n16>
- Lysklett, O. B., & Berger, H. W. (2017). What are the characteristics of nature preschools in Norway, and how do they organize their daily activities? *Journal of Adventure Education and Outdoor Learning*, 17(2), 95–107. <https://doi.org/10.1080/14729679.2016.1218782>
- Merrick, C. (2016). Nature-based preschools take the national stage. Nature Start Alliance. Retrieved from <https://naturalstart.org/resources/articles/nature-based-preschools-take-national-stage#:~:text=That%20was%20followed%20by%20programs>
- Moser, T., & Martinsen, M. T. (2015). The outdoor environment in Norwegian kindergartens as pedagogical space for toddlers' play, learning and development. *European Early Childhood Education Research Journal*, 18(4), 457-471. 10.13140/RG.2.1.4885.5764.
- Rashid, M., Hodgson, C. S., & Luig, T. (2019). Ten tips for conducting focused ethnography in medical education research. *Medical Education Online*, 24:1, 1624133, DOI: 10.1080/10872981.2019.1624133
- National Association for the Education of Young Children. (2018). Staff-to-child ratio and class size. Retrieved from https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/accrreditation/early-learning/staff_child_ratio_0.pdf
- North American Association for Environmental Education (NAAEE). (2019). *Nature-Based Preschool Professional Practice Guidebook*. Merrick, C. (Ed.). NAAEE.

- North American Association for Environmental Education (NAAEE). (2023). *Nature Preschools in the United States: 2022 National Survey*. NAAEE. Retrieved from https://naturalstart.org/sites/default/files/staff/natstart_2022_national_survey_final_draft.pdf
- Reeves, R. V. (February 27, 2024). Missing misters: Gender diversity among teachers. American Institute for Boys and Men. Retrieved from <https://aibm.org/research/missing-misters/#:~:text=Men%20are%20especially%20unlikely%20to,43%25%20of%20high%20school%20teacher%20S.>
- Sandifer, P. A., Sutton-Grier, A. E., & Ward, B. P. (2015). Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation. *Ecosystem Services*, 12, 1-15.
- Scott, S., Gray, T., Charlton, J., & Millard, S. (2022). The impact of time spent in natural outdoor spaces on children's language, communication and social skills: A systematic review protocol. *International Journal of Environmental Research and Public Health*. 19, 12038, 14 pp.
- Utdanningsdirektoratet (2025). Fakta om barnehager 2024 (Facts about kindergartens 2024). Retrieved from <https://www.udir.no/tall-og-forskning/statistikk/statistikk-barnehage/analyser/2025/fakta-om-barnehager-2024/>

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RESEARCH-TO-PRACTICE BRIEF

Embracing Fire as a Loose Part in Early Childhood Education

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Keywords: nature-based early childhood education, loose parts, risky play, fire, fire safety

The Challenge / Problem Statement

Gasp!?! Fire as a loose part? Simon Nicholson (1971), who coined the term “loose parts,” states that “children love to interact with variables, such as materials and shapes; smells and other physical phenomena, such as electricity, magnetism and gravity; media such as gases and fluids; sounds, music, and motion; chemical interactions, cooking and fire; and other people, and animals, plants, words, concepts and ideas. With all these things, all children love to play, experiment, discover, and invent and have fun” (p. 30). Yet, in almost any modern early childhood setting, mentioning fire as an interactive learning experience prompts an immediate, audible gasp.

In today's highly regulated educational settings, children are rarely permitted to explore or discover the natural world through fire. However, with the right safety parameters, the learning possibilities are wide. This research study examined how early childhood educators view, implement, and manage fire as a constructive, experimental loose part.

Research Approach, Participants, & Settings

Research Methodology	Online mixed-methods survey distributed via convenience sampling on social media platforms.
Participant Criteria	290 qualifying educators working in the United States, aged 21+, caring for children ages 2–8, who regularly spend instructional time outdoors in nature.
Sample Demographics	Predominantly female teachers working with children aged 3–5 within established nature-based schools or outdoor classrooms.
Outdoor Exposure	Most cohorts spend 10–15 hours weekly in natural environments, encompassing educators who both currently allow or prohibit fire engagement.

Key Research Findings

How is fire considered a loose part? Primary interactions focus on campfires, pretend dramatic fire play, and using leftover charcoal for mark making. One participant highlighted that fire functions as an ultimate open-ended medium:

“Fire is as open-ended as the simple stick. The stick is at once a sword, a building material, and a paddle for magic potions; so too the fire is the means of culinary metamorphosis, a destructive engine, and a center of community so powerful it often goes without saying.”

Safety and Incident Profiles: Respondents used a gradual approach to fire safety, including establishing safety parameters and practicing safety parameters around a fire, and practicing how to put out a fire. Minor burns or eye irritation were noted in some cases; however, most participants reported no injuries. Experienced programs noted establishing robust staff-led risk/benefit evaluations effectively counteracted operational safety anxieties.

Best Practices: Best practices include supervision of fire area, practicing safety and fire protocol, encouraging “walking feet” for children and adults alike, designating area for fire, having accessible first aid kit, using a fire safety circle, and thoroughly putting out the fire.

Recommendations for Practice

- Develop a rationale for why fire play should be used in your setting.
- Understand the developmental, local, and environmental issues around fire and limit fire as needed, depending on local environmental needs.
- Create, implement, and follow safety guidelines that address all policies, procedures, and concerns. Have conversations about safety parameters and how the program meets and exceeds safety standards, without eliminating flame around fire. Do the work to have hard conversations.
- Develop training that informs, demonstrates, and evaluates the use of fire play activities for teachers and staff.
- Use benefit/risk assessments for the program with continual assessment of risky play in the setting.
- Seek parental buy-in by communicating and educating parents on the benefits of fire play.
- Adapt fire safety to the developmental needs of children.

Action Steps for Educators: If inspired, try your own fire play with a loose parts mindset. Following typical safety protocol, give yourself freedom to experiment with mark making with charcoal, mixing charcoal ink, grab a candle and matches to make your own wax art, or try making your own mini fire. As educators, we need to take the time for play, experimentation, and exploration—fire can be a perfect option to embrace both risky and loose parts play!

Professional Resources

Loose Parts Nature Play Podcast: 'Embracing Fire as a Loose Part' | [Loose Parts Nature Play](#)

Fire Engineers: Book and Resource List | [IJECEE \(2025\), 12\(2\)](#)

References

Nicholson, S. (1971). How not to cheat children - The theory of loose parts. *Landscape Architecture*, 62, 30-34.

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CHILDREN'S BOOKS AND RESOURCES REVIEW

Carla Gull

Book and Resource Review Editor

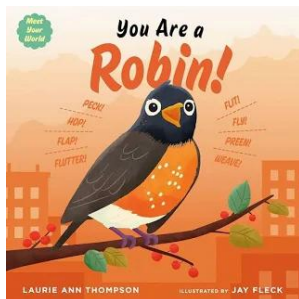
Hawai'i Academy of Arts and Science Public Charter School, USA

Developing Empathy in a Natural Context

Young children love to “become” an animal, making the sounds and taking the perspective of nature. David Sobel once said:

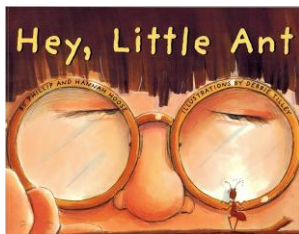
Cultivating relationships with animals, both real and imagined, is one of the best ways to foster empathy during early childhood. Children want to run like deer, to slither along the ground like snakes, to be clever as a fox and quick like a bunny. There's no need for endangered species here – there are more than enough common, everyday species to fill the lives of children. And the environmentally correct notion of not anthropomorphizing animals can be thrown out the window (Beyond Ecophobia, 1996).

Here is a collection of books and resources that might foster that perspective taking and empathy building in early childhood, including a couple of tree-based options and one with the wind.



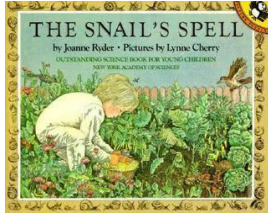
***You Are a Robin!* By Laurie Ann Thompson**

In this interactive board book series, the child becomes the animal! Tap, tap, tap like a robin chick breaking from the egg. Shiver, snuggle, and sleep under mom's wings. Flit, flap, and flutter as you begin to fly. Stop, look, and listen as you migrate home, carry, weave, smooth, fill, and smooth your nest. In each spread of pages, there are illustrations of children doing similar actions in their everyday lives. **See also:** *You Are a . . . Raccoon, Garter Snake, Honey Bee* by the same author!



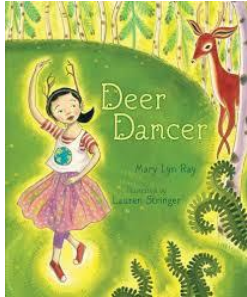
***Hey, Little Ant* by Phillip and Hannah Hoose**

A boy is just about to squish an ant, when the ant pleads to not be squished. The boy and ant converse back and forth as they understand each other better. Even though the boy's parents and friends say he should squish the ant, the ant convinces him to make his own decision. Love the fold out page that makes the boy look huge next to the ant.



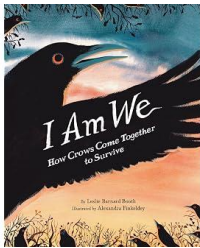
***The Snail's Spell* by Joanne Ryder**

A young child in the garden gradually becomes smaller and smaller, taking on characteristics of the snail, such as no legs or arms and being able to glide on a sticky path. You have tiny teeth on a tongue, feelers on top of your head, and a shell on your back.



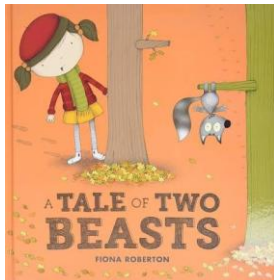
***Deer Dancer* by Mary Lyn Ray**

A girl encounters a deer in a clearing and makes a connection before it runs away. Cut to her ballet class and her teacher tells her to imagine antlers on their heads, yet the girl doesn't move the way she should. However, in the clearing outside, she dances with the deer, leaping, throwing antlers back, and turning round and round.



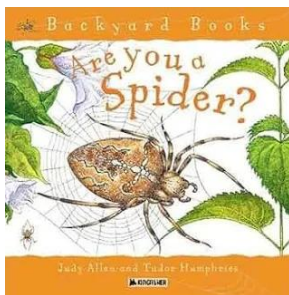
***I Am We: How Crows Come Together to Survive* by Leslie Barnard Booth**

Told in first person and changing to we early on, this book looks at how crows come together in the winter to survive the winter changes. All their eyes work together to stay safe. Good back matter to understand crow behaviors in more depth.



***A Tale of Two Beasts* by Fiona Robertson**

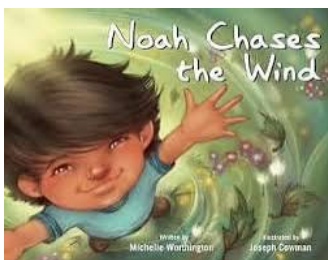
A girl finds a distressed animal in the woods and brings it home, cleans it, and dresses it up. The animal leaves, but later returns. The same story is told again from the animal's perspective, being taken from its home and paraded in clothes out and about. It escapes but returns for the warm hat from the girl. They decide they like each other and head out to the woods.



***Are You a Spider?* by Judy Allen**

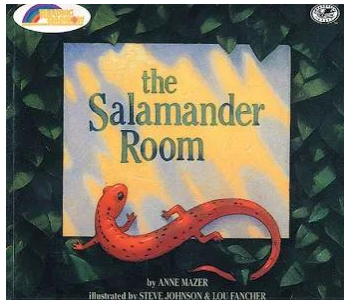
This nonfiction book takes you through being inside an egg, hatching alongside many siblings, the different body parts and functions, how you will move about, spinning a web, catching prey, and avoiding predators. It ends with pictures of children who are humans and how they are different from a spider while comparing how they are similar. It ends with many did you know questions.

See also: Are You a . . . Butterfly, Snail, Bee, Ant, Dragonfly, etc.?



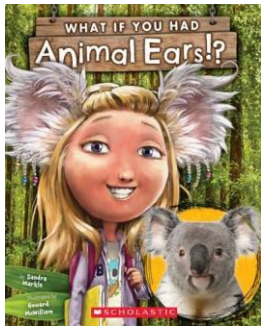
***Noah Chases the Wind* by Michelle Worthington**

Noah experiences the world in different ways, asking many questions. He is curious about the weather, yet the books don't answer his inquiry about the wind. He goes outside to watch it and gets swept away to experience the wind in very different way.



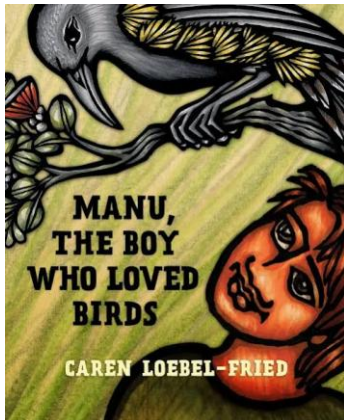
Salamander Room by Anne Mazer

A boy finds a salamander in the woods and wants to bring it home. His mother asks a series of questions about where it will sleep, what it will eat, and other necessities, including where the boy will sleep. As the boy explains his plan, his illustrated room becomes more and more like the forest with trees, moss, insects, tree stumps, birds, bullfrogs, and an open roof.



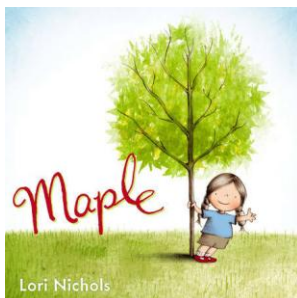
What if You Had Animal . . . ? Series by Sandra Markle

Each book in this series focuses on one animal body part—ears, noses, eyes, feet, etc. The book asks what would happen and then we learn more about how a wide variety of animals and the adaptations that make them unique and suited for living in the wild. A photo of the animal, along with drawings of children with that animal characteristic. Informative and humorous!



Manu, The Boy Who Loved Birds by Carol Loebel-Fried

Manu 'ō'ō is named after an extinct endemic bird. His class visits the Bishop Museum in Honolulu and he sees a cape of 'ō'ō feathers. He gets intrigued about his namesake and learns as much as he can about the bird! He dreams of the song of the 'ō'ō and becomes the bird being caught by a traditional bird catcher. The class considers the perspective of the islands from an 'ō'ō's perspective. Good visualization and perspective taking from the bird's point of view, including Manu flying! His family goes birdwatching on Moku o Keawe and learns about many birds and calls. They also visit the captive breeding spot for many birds. He eventually dreams again of becoming the 'ō'ō. Back matter includes many cultural and historical connections, along with actions to take.



Maple by Lori Nichols

When Maple was born her parents planted a maple tree in her honor. The tree grew as she did and became a trusted friend. She sang to the tree, danced with it, and pretended to be a tree. Some days the tree's leaves danced for her. She shared her coat as it got chilly. Her family had a new baby. While Maple couldn't always please the baby, they both enjoyed being under the maple tree's dancing leaves next to the new Willow tree.

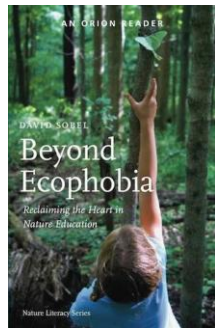


***Be a Tree!* by Maria Gianferrari**

This book compares the human body to a tree, with the trunk like our spine, the bark like our skin, etc. Love the visualizations and social/emotional aspect of the book and how we all need to help take care of each other. This is a book I like to read outside next to trees, imagining our toes rooted in the ground and gently feeling the bark with our skin.

Additional Resources

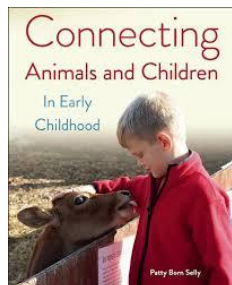
Be a Tree visualization: See page 10 of [5 Minute Fieldtrips](#) (for a guided imagery of a tree experiencing various seasons. The instructions suggest that the exercise can be modified to build empathy with other living things as long as sensory components are rich. Adapted from *Sharing the Joy of Nature* by Joseph Cornell.



***Beyond Ecophobia* by David Sobel**

In this quick read, Sobel suggests children need to connect to the natural world before we ask them to save it. He outlines three developmental stages, starting with empathy and developing animal allies; moving to exploration and teaching the landscape; and then moving toward more ecological action as teens. While still a foundational piece, I also wonder how we will change as children experience more effects of climate change first hand.

Lerstrup, I., Chawla, L., & Heft, H. (2021). **Affordances of Small Animals for Young Children: A Path to Environmental Values of Care.** *International Journal of Early Childhood Environmental Education*, 9(1), 58-76. https://naturalstart.org/sites/default/files/journal/9.lerstrup_chawla_heft_0.pdf. This article looks at how children interact with small animals in outdoor contexts and how it leads to learning to care for them and eventually long-term attitudes to protect biodiversity, connecting to Sustainable Development Goal #15.



***Connecting Animals and Children in Early Childhood* by Patty Born Selly**

I've turned to this book many, many times as I've understood better how children connect to animals. The book connects research and practical advice around developmental benefits, how our language might impact children's relationships with animals, the wide range of animals in children's lives, and application for the classroom. .

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