



Research and Resources: Nature-Based Education

What is a Nature Preschool? How do Forest Kindergartens support students' growth? What are the benefits of a nature-based education program?

This resource is a collection of pedagogies, philosophies and cited benefits associated with nature schools that are backed by research. **These cited sources are made available for further reading to: aid educators in incorporating nature-based practices into their classrooms, provide justification for administrators or parents, or simply inform interested parties.** This is not an exhaustive list, but highlights some of the most key elements for successfully engaging in nature-based programs.

A note on terminology: Nature-based education is an emerging field of education in the United States. As such, many terms are used to describe the various flavors of this educational approach: Nature Preschools, Forest Kindergartens, Forest Schools, or Nature-based Early Childhood Education. Sources may use one or all of these terms, sometimes interchangeably. Generally, the principles in one type of program are applicable across all program formats and age spans.

Overall Background and Philosophy for Nature-Based Education

Resources

- **Natural Start Alliance.** A project of the North American Association for Environmental Education focused on promoting quality and access to early childhood environmental education in nature. This organization provides research, best practices, networking, and other support for practitioners and administrators working with young children in natural settings. www.naturalstart.org
- **Children & Nature Network.** A non-profit organization that supports “a global movement of leaders working to turn the trend of an indoor childhood back out to the benefits of nature — and to make sure that all children have equitable access to outdoor spaces where they can learn, play and grow.” They have a collection of free toolkits, reports, infographics and advocacy tools designed to help individuals and organizations connect children, families and communities to nature. www.childrenandnature.org

Books:

- **Nature Preschools and Forest Kindergartens: The Handbook for Outdoor Learning.** An introductory level guide to understanding and implementing nature-learning experiences for children. Includes overview of organizing principles as well as implementation-oriented resources including curriculum development, budgeting and facilities. *Sobel, D., 2016.*

- **Nature-Based Preschool Professional Practice Guidebook.** This resource describes the practices of excellence associated with nature-based education, broken into four categories: Teaching, Environments, Safety, and Administration.
North American Association for Environmental Education, 2019.
- **Forest kindergartens: the Cedar song way.** “[Dive] into the rationale, philosophy, approach and day-by-day management realities of being authentically in the outdoors...Close contact with nature contributes to young childrens’ motor, sensory, social, emotional, moral and cognitive development, as well as a child’s physical health and mental well-being...Today the Cedar song Forest Kindergarten is the gold standard in the U.S. of the German waldkindergarten model.”
Kenny, E. K., 2014.
- **Establishing a Nature-based Preschool.** A practitioner’s guide to philosophy, background, and nuts and bolts of operating a preschool program. Includes best practices (e.g staffing ratios), program resources, and other tools.
Larimore, R., 2011.
- **Forest School in Practice: For All Ages.** “Forest School expert and teacher Sara Knight...inspires and encourages individuals of all ages to take an innovative approach to outdoor play and learning. The images throughout the book bring alive Forest School activities and each chapter is accompanied by creative ideas for practice and in depth case studies from across the United Kingdom and Ireland exploring the amazing variety of nature provision.”
Knight, S., 2016.

Literature Summaries:

- **Children’s Contact with the Outdoors and Nature: a Focus on Educators and Educational Settings.** “These articles and documents synthesize the literature related to children’s contact with the outdoors and nature and, in many cases, highlight children’s contact as it relates to educational settings.”
Charles, C. & Senauer, A., 2010. Children & Nature Network.
- **Forest Kindergarten Literature Review.** “Forest kindergartens are seen as an attempt to address...concerns by providing children with access to the natural environment and re-establishing a healthy balance of indoor and outdoor time... Regardless of name or structure, all of these programs that grew from the forest kindergarten movement have key underlying features in common.”
Roberts, N., 2018. Merry Lea Environmental Learning Center of Goshen College.

Webpages:

- **Forest Schools: A Philosophy of Child-Led Learning.** “Forest school curriculum is child-directed and play-based. The forest school allows learners the time and space to develop their interests, skills, and understanding through practical, hands-on experiences.”
Kostic, M., 2016. Novak Djokovic Foundation.
- **What is Forest School?** “Forest School is a child-centred inspirational learning process, that offers opportunities for holistic growth through regular sessions. It is a long-term program that supports play, exploration and supported risk taking. It develops confidence and self-esteem through learner inspired, hands-on experiences in a natural setting.”
Forest School Association.

United States Forest School Surveys

- **Nature Preschools and Forest Kindergartens: 2017 National Survey.** “A national survey of nature-based early childhood educators conducted in 2017 identified more than 250 nature preschools and forest kindergartens operating across the country.” Less than 5 recognized NbeCE programs were in the state of Indiana.
North American Association for Environmental Education, 2017.
- **Nature Based Preschools in the US: 2020 Snapshot.** “Over the past three years, nature-based preschools, forest kindergartens, and outdoor preschools... in the US have more than doubled to 585, and nature preschools can now be found in nearly every state in the United States. Over the past decade, this represents a nearly 25-fold increase.” “Nature is widely recognized as an important, and often low-cost, tool for fostering children’s health and development.”
North American Association for Environmental Education, 2020.





Risky Play

All programs that incorporate a forest school approach provide an environment for supported and appropriate risk taking. As children engage in emergent play outdoors, they learn to assess and navigate risk. This is otherwise known as risky play: a feature of holistic development.

Common risks encountered in Kinderforest and Nature Preschool settings may include using tools, balancing on logs, building campfires and climbing trees. Encounters with risk help children learn how to manage those challenges, encouraging critical thinking, self-confidence, social skills, and fine and gross motor skills development. The reasons for any safety rules or modifications in safety guidelines are clearly explained and discussed with the students.

RESOURCES

Books:

- **Adventures in Risky Play.** A resource for practitioners examining the philosophy and practice of facilitating risky play for children.
Keeler, R., 2020.

Journal Articles:

- **Forest School and its impacts on young children: Case studies in Britain.** Forest School case study in Wales and England from 2002 to 2005 on the positive impacts on children in terms of confidence, social skills, language and communication, motivation and concentration, physical skills, and knowledge and understanding.
O'Brien, L., & Murray, R., 2007. Urban Forestry & Urban Greening.
- **Does engagement in Forest School influence perceptions of risk, held by children, their parents, and their school staff?** "This study investigated perceptions of risk associated with the outdoors, held by children, their parents and practitioners, and whether accessing Forest School impacts on these perceptions of risk."
Savery, A. et al., 2017. Education.
- **The nature of learning at forest school: practitioners' perspectives.** "[Forest School] practitioners identified the focus of learning at forest school as social development: teamwork, relationships with others, self-knowledge, and learning to take risks. Children also engaged with nature and developed an attachment to the woods...Forest school leaders saw themselves as facilitators of learning rather than teachers."
Harris, F., 2017. Education.

Other Resources

- **General Safety and Behavior Guidelines.** This document captures the overall guidelines that educators may consider or implement in their own nature-based activities. Some of these guidelines include facilitating risky play, encouraging respectful behavior and adjusting to weather.
Merry Lea Environmental Learning Center of Goshen College.

Sit Spots

Sit spots are designed to hone students' observation skills, build familiarity with 'place' and develop kinship with natural places. At Merry Lea, a sit spot is a student-selected location in the outdoor classroom, which students routinely visit to sit and observe (usually between 5-15 minutes) on each program day. During this independent time, students do not interact with or participate in conversations with other students.

Research shows that sit spot time is an opportunity for self-exploration, to develop a sense of self-awareness and an appreciation for a student's own space. Each student will have a journal in which they can record their thoughts, their observations of what they hear, smell and see, pose questions or share their feelings. After the allotted time, students will have a chance to share in a whole group discussion about what they recorded or experienced during their sit spot time.



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Journal Articles:

- **Creative Connecting: Early Childhood Nature Journaling Sparks Wonder and Develops Ecological Literacy.** "The addition of a journal practice to regular outdoor environment exploration allows the child to assimilate their observations and experiences while laying a foundation for literacy education." "[The] development of the child within her natural environment is invaluable for further improving the way we teach children with and for nature."
Johnson, K., 2014. International Journal of Early Childhood Environmental Education.

News Articles:

- **Kindergarten, Naturally.** "The teacher, Pelo, explained...how she and the two aides aspire to teach the kindergartners in the woods. She described this approach as "secret" learning, when children are unaware that they're learning academic content. In the forest, these Finnish educators might lead the children to find sticks of varying lengths and organize them from shortest to longest, form letters out of natural materials, or count mushrooms."
Walker, T.D., 2016. The Atlantic.

Webpages:

- **Build Children's Observation Skills with Sit Spots.** "Sit spots also provide children with an opportunity to hone their observation skills and reflect on all of the new sensations that they experience on a daily basis. When a child makes a connection on his or her own it is more rewarding (and more memorable) than when they learn about it second hand."
Fravel, N., 2017. Oregon Association for the Education of Young Children.
- **Sit Spot Practices for Kids.** "A Sit Spot can become like an anchor in your life — a place to settle down, cultivate present-moment awareness and a quieter mind, and to observe the flow of reality occurring around you."
Mentor, C., 2020. Wilderness Awareness School.
- **Deepening Students' Connection to Nature.** "The use of nature journals can be empowering for students as it helps increase their awareness of nature, gives them a sense of their place in their world, and encourages future conservation behaviors."
Keel, S., 2018. Edutopia.org.

Other Resources:

- **Reflective Sit Spots.** "Attentiveness to the natural world is one of the goals of a sit spot. Observing the relationships and designs found in nature can inspire questions and lead to the first step of the scientific method: 'Inquiry!'"
Strich, D. Green Teacher.
- **Sit Spot Pedagogy and Academic Alignments.** Research shows that sit spot time is an opportunity for self-exploration, to develop a sense of self-awareness and an appreciation for a student's own space. Each student has a journal to record their thoughts, their observations of what they hear, smell and see, pose questions or share their feelings.
Merry Lea Environmental Learning Center of Goshen College.



Nature-based Experiences Improve: **Social and Emotional Learning**

"Social and emotional learning (SEL) is the set of skills, knowledge, and behaviors involved in understanding and managing emotions, setting positive goals, feeling empathy for others, engaging in positive relationships, and solving problems effectively." (McGraw Hill)

As schools become more inclusive of students from diverse social, economic and cultural backgrounds, SEL provides a common foundation for serving students to excel academically, behaviorally and socially. Nature-based experiences support SEL by positively impacting childrens' confidence, self-esteem, social behavior and mental health.

RESOURCES

Case Studies & Summaries:

- **Research Digest: Mental Health & Emotional Well-being.** "This Digest showcases recent findings regarding the impact of nature contact on mental health and emotional well-being, an area that has been extensively studied by researchers." *Children & Nature Network, 2020.*
- **A narrative and systematic review of the behavioural, cognitive and emotional effects of passive nature exposure on young people: Evidence for prescribing change.** This paper provides both a narrative and a systematic review of the literature on the emotional, behavioral, and cognitive benefits of nature for children. Findings from this research review show that even passive nature exposure has the potential for contributing to children's behavioral, cognitive and emotional development. *Norwood, M.F. et al., 2019. Landscape and Urban Planning.*
- **Outdoor Education – Research Summary.** Benefits of learning outdoors is synthesized in this document, along with descriptions and links to specific research papers. Some of these benefits include increased: school performance, physical, mental and social health, child development, civic engagement and sense of place. *LEAF, Wisconsin's K-12 Forestry Education Program.*

Journal Articles:

- **Using outdoor learning to augment social and emotional learning (SEL) skills in young people with social, emotional, and behavioural difficulties (SEBD).** This study investigated the effectiveness of an outdoor learning intervention program specifically designed for students with SEBD. This research suggests that "outdoor learning can be an effective approach for educators wishing to augment the SEL skills of young people with SEBD." *Price, A., 2019. Journal of Adventure Education and Outdoor Learning.*
- **Youth Activities and Children's Subjective Well-Being in Korea.** This study addressed the correlation between Korean youths' well-being and high rates of suicide. "This paper studies whether children's participation in youth activities affects subjective well-being (SWB)...Moreover, some activities such as adventure and environment programs associate with a higher level of SWB than other programs or activities do. We also find that various environmental factors affect children's SWB." *Park, K. & Wang, S., 2019. Journal of Happiness Studies.*
- **Facilitating social emotional learning in kindergarten classrooms: Situational factors and teachers' strategies.** This study suggests that teacher support for SEL occurred most frequently during outdoor settings. These findings suggest that more outdoor play during the school day may result in increasing opportunities for SEL. *Ng, S.C. & Bull, R., 2018. International Journal of Early Childhood.*

Webpages

- **Early-Childhood Education Takes to the Outdoors.** "Waldkindergarten...literally means "forest kindergarten"...As the name implies, forest kindergarten takes place outside -- not most of the time, but (with the exception of inclement weather) all the time, from 8:30 a.m. to 2:30 p.m., five days a week. Wet or warm, sun or snow, the students in waldkindergarten learn through exploration in an unconventional classroom: the woods." *Mills, A., 2009. Edutopia.org.*
- **Why Social and Emotional Learning Is Essential for Students.** "Social and emotional learning (SEL) provides a foundation for safe and positive learning, and enhances students' ability to succeed in school, careers, and life." *Weissberg, R., 2016. Edutopia.org.*

Nature-based Experiences Improve: School Performance and Academics

Although meeting academic standards is not the intent behind NBECE, they are inevitably supported within well-designed and high-quality nature-based programs. Whether students are provided with materials and activities or given time for unstructured play, the outdoors offers ample opportunities for students to explore, learn and engage their thinking.



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Literature Summaries and Toolkits:

- **Back to School: Back Outside! How Outdoor Education and Outdoor School Time Create High Performance Students.** "In this report, we summarize the available studies on the role of outdoor learning programs and outdoor play time in furthering children's overall education: improving their lifelong learning skills, prospects for career success and school test scores."
Coyle, K., 2010. National Wildlife Federation.
- **Fostering Outdoor Observation Skills: Preparing Children for Outdoor Science and Recreation.** "Nature literacy is more than the intellectual knowledge of place or the names of flowers and birds detached from a meaningful context...Nature literacy awakens habits of perception (sensory awareness) and cultivates a rich vocabulary of search images (knowledge of place)."
Dvornich, K., Petersen, D., & Clarkson, K., 2011. Pacific Education Institute.

Journal Articles

- **Nature-based education and kindergarten readiness: Nature-based and traditional preschoolers are equally prepared for kindergarten.** This article provides empirical that, for preschoolers, learning in an outdoor environment can be just as effective in promoting academic and social-emotional goals as learning in a more traditional environment.
Cordiano, T.S. et al., 2019. International Journal of Early Childhood Environmental Education.

Other Resources:

- **Kinderforest: Connections to Indiana Academic Standards.** How does Kinderforest connect to academic standards? Although meeting academic standards is not the intent behind nature-based early childhood education, they are inevitably supported within well-designed and high-quality Forest Kindergartens. Learn about how this can be accomplished in this white paper.
Stoltzfus, M., 2019. Merry Lea Environmental Learning Center of Goshen College.
- **A Guide on Creating Kinderforest Lesson Plans.** Using Kinderforest's pedagogical approach to connect nature-based activities with classroom curriculum can be challenging. To help with this, these guidelines describe best practices when developing facilitated activities for a Kinderforest day. They can be used as a guide when choosing activities, writing lesson plans and preparing accompanying materials.
Merry Lea Environmental Learning Center of Goshen College.
- **Nature can Improve Academic Outcomes.** "Spending time in nature enhances educational outcomes by improving children's academic performance, focus, behavior, and love of learning."
Children & Nature Network, 2016.
- **Green Schoolyards can Improve Academic Outcomes.** "Green Schoolyards prompt academic achievement through hands-on, experiential learning, and by enhancing the cognitive and emotional processes important for learning."
Children & Nature Network, 2017.



Nature-based Experiences Improve: **Child Development**

There is a robust body of research that supports nature's important role in children's development in every major way: intellectually, emotionally, socially, spiritually and physically. When nature is incorporated in children's learning and play, they develop increased capacities and confidence in creativity, problem-solving and other forms of intellectual development.

RESOURCES

Webpages

- **The Benefits of Nature Play for Children.** Unstructured and child-directed nature play boosts creativity, movement that promotes physical health, social skills, self-confidence and more.
First Five Years, 2020.
- **Nature School: Taking Preschool to the Great Outdoors.** "Imagine a preschool with no walls; a place where children are encouraged to follow their interests. Where math and measurement are practiced in a mud kitchen, and scientific thinking happens naturally while rolling over a log to find insects."
Kelzenberg, M., 2020. Three Rivers Park District.

Other Resources

- **Green Schoolyards Encourage Beneficial Play.** "Natural Areas promote child-directed free play that is imaginative, constructive, sensory rich and cooperative."
Children & Nature Network, 2015.
- **Benefits of Connecting Children with Nature: Why Naturalize Outdoor Learning Environments.** "Childcare center naturalized outdoor learning environments (OLEs) stimulate the diversity of children's play experience and contribute to their healthy development...This InfoSheet discusses the benefits of connecting children to nature and presents examples of simple ways to naturalize outdoor learning environments in childcare centers."
Natural Learning Initiative, 2012.
- **Chapter 7: The Risks and Benefits of Nature Play.** This chapter documents the balance of risky nature play with benefits to child development, including cognitive, creative, physical, social/emotional and spiritual wellbeing. It also discusses safety and parent communication.
Finch, K., 2016. In D. Sobel (Ed.), Nature Preschools and Forest Kindergartens: The Handbook for Outdoor Learning.

Nature-based Experiences Improve: **Physical Activity**

Along with outdoor emergent play and risky play practices, children actively engage in activities that improve their physical health. These activities may involve strength-building, running, climbing and other forms of exercise. The outdoors also improve children's physical health more passively, as they are exposed to fresh air, sunshine and other forms of contact with nature.

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Literature Summaries:

- **Research Digest: Physical Health Benefits of Nature Contact.** "This special issue focuses on the physical health benefits of both passive and active forms of nature engagement. Also discussed are several ideas about how health-care professionals are tapping into the health-promoting powers of nature engagement."
Children & Nature Network, 2020.

Other Resources

- **Nature can Improve Health and Wellbeing.** "Spending time in nature provides children with a wide range of health benefits."
Children & Nature Network, 2016.
- **Green Schoolyards can Increase Physical Activity.** "Green Schoolyards can promote physical activity by offering a variety of active play options that engage children of varying fitness levels, ages, and genders."
Children & Nature Network, 2016.

Nature-based Experiences Improve: **Civic Engagement**

Individuals who develop a sense of place and a personal connection to the environment understand the impacts their choices have on their local and global environments. Promoting environmental literacy and positive connections with nature helps motivate students to develop effective actions for maintaining economic and ecological sustainability. As outdoor experiences foster self-confidence in inquiry and analytical skills, students are able to make sound conclusions about what should be done to sustain a healthy environment.

RESOURCES

Journal Articles:

- **Connectedness to nature: Its impact on sustainable behaviors and happiness in children.** "[Children who] participated in the study...responded to a research instrument that measured connectedness to nature, sustainable behaviors (pro-ecological behavior, frugality, altruism, and equity), and happiness...The results revealed a significant relationship between connectedness to nature and sustainable behaviors, which, in turn, impact happiness. [And] the more pro-ecological, frugal, altruistic, and equitable the children are, the greater their perceived happiness will be."
Barrera-Hernández et al., 2020. Frontiers in Psychology.



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