Nature-Based Learning as a Strategy to Enhance Education & Create Green Communities

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Children and Nature Network
NBLR Collaborative objectives and outcomes:

- Definition of NBL
- Literature review
- A research agenda to advance the field
- Collaborative research projects
- Publications, including a special section of *Frontiers in Psychology*
Three convenings of 18 invited Network members plus 5 representatives of grantee institutions

- November 2015 – three-day retreat
- November 2016 – three-day retreat
- June 2018 – gathering during Children & Nature Network Leadership Summit

Educational science
Early childhood education
Environmental education
Developmental psychology
Environmental psychology
Ecopsychology
Neuroscience
Cognitive science
Stress neurobiology
Environmental design
Landscape architecture
nature-based learning
an educational approach that utilizes the natural environment as the content or context for learning
nature-based learning

- It occurs where nature is present, outdoors or indoors.

- It involves learning with exposure to nature, as the focus of nature-based activities or in the background.

- It includes learning about the natural world, but extends to engagement in any subject, skill or interest while in natural surroundings.
nature-based learning

- It involves the development of knowledge, skills, values, attitudes and behaviors in the realms of academic achievement, personal development, environmental stewardship and more

- It can occur with varying degrees of guidance or structure, during informal, nonformal and formal education, across the age span, and in urban, suburban, rural and wilderness settings
environmental education research

garden-based educational research

NBL

environmental education research

nature-based public health research
natural surroundings as the context for learning in school

In public high schools in Michigan with more natural features such as trees and shrubs close to classroom and cafeteria windows, students had significantly:

- higher standardized test scores
- higher graduation rates
- greater percentages of students planning to attend college
- lower rates of criminal behavior

Third graders in Chicago public schools with more tree cover on school grounds performed significantly better on standardized tests of math and marginally better on tests of reading.

The most disadvantaged schools had half the tree cover of the least disadvantaged schools.

natural surroundings as the context for learning in school

- Higher levels of greenness surrounding Massachusetts schools were associated with lower absenteeism, independent of air pollution.
  

- Primary school students in Barcelona with more surrounding greenness at home, school and during commuting had greater 12-month gains in working memory and reduction in inattentiveness—partly mediated by reduced exposure to air pollution.
  
natural surroundings as the context for learning in school

In a true experiment, high school students with windows that overlooked a green space (versus a built space or no windows), performed better on tests of attention and recovered more quickly from stressful experiences.

Li, D. & Sullivan, W. C. 2016. Impacts of views to school landscapes on recovery from stress and mental fatigue. *Landscape and Urban Planning*, 148,
natural surroundings as the context for learning in school

▪ When six plants were placed in the back of a junior high school classroom in Taiwan, the treatment class immediately and significantly reported stronger feelings of preference, comfort and friendliness for their class compared to a control class.

▪ They also had significantly less absence and punishment records.

natural surroundings as the context for learning

Scottish students (mean age 11) completed questionnaires in a school setting prior to being taken to a forest school or conventional classrooms, and completed post-tests at the end of the day. After a day in the forest, students reported:

- greater energy and a happier mood
- reduced stress and anger

Students classified for bad behavior showed the greatest positive changes.

In 33 out of 40 school garden studies conducted between 1990 and 2010, students showed improved outcomes in science, math or language arts through participation in school garden programs v. conventional classrooms.

the natural environment as an Integrated Context (EIC) for learning

Over three years, student performance in three Louisiana elementary schools (80% African-American, 85% free or reduced lunch) was compared with district and state averages when their schools adopted an EIC approach focused on local natural resources.

Gaps of 10.7% and 15.6% in math and social studies at the beginning of Year 1 were reduced to 0.2% and 7.5% by end of Year 3.

natural surroundings as the context for social-emotional development

On naturalized playgrounds, students play more creatively and cooperatively.


photos by Emily Stanley
natural surroundings as the context for psychological health

More neighborhood green space is associated with fewer emotional problems in young children from socially disadvantaged families.

3-5 year olds in poverty

Flouri, Midouhas & Joshi. 2014. The role of urban neighbourhood green space in children’s emotional and behavioral resilience. *Journal of Environmental Psychology, 40*: 179-186.

4-6 year olds of mothers with low levels of education

natural settings as the context for general development & well-being

1-3 year olds were compared in nursery schools which emphasized outdoor play and learning (primarily in school garden) versus traditional nursery schools (76 v. 84 toddlers). Teachers evaluated each child in January and again in June.

Outdoor toddlers showed significantly greater improvement in cognitive, emotional, social, and fine motor skill development and awareness of their environment.

Children are more physically active on green schoolgrounds, & young children who play on natural terrains perform better on tests of balance & motor coordination than children who play on traditional playgrounds. Dyment & Bell, 2008; Fjortoft 2001, Grahn et al. 1997; McCurdy et al., 2010 in Chawla (2015).
Strong predictors of lifelong active care for the natural world include:

- routine childhood play and exploration in nature

opportunities to learn how to take action for nature from family members or in schools or out-of-school programs

youth community service gardening with 2-5 year olds in Casa Cuna, a free day care center in Puebla, Mexico
supportive family members, teachers, mentors or friends

Roaring Fork Valley H.S. community garden
Valley Settlement Program for immigrant families
photo by Genevieve Villamizar
Three Categories of Research Agenda Questions

• learning outcomes and differential effects

• mechanisms of influence

• implications for policy and practice

Game Changing Questions
research questions that are most likely to yield critical information for practice and policy
How does nature affect the learning of children with special needs as a result of:

- physical health
- mental health
- cognitive conditions, such as ADHD
- learning differences
- educational disadvantages due to low income
elementary school ground in London, Ontario before and after participatory redesign for nature play and learning

photos courtesy Janet Loebach