

Nature-based vs. Classroom-based Science Learning: Mediating and Moderating Effects



UNIVERSITY OF MINNESOTA | EXTENSION

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WHAT:

The exploratory research project will document if nature-based science instruction impacts science learning differently than classroom-based instruction, begin to elucidate the mechanisms that explain this effect, and determine if the relationships among learning context, mechanisms, and learning outcome are moderated by student economic disadvantage.

WHY:

Though gaps exist, research shows a connection between nature exposure and learning-related variables¹. The mechanisms that underlie this connection are less clear. Some studies of other outcomes show that more disadvantaged individuals benefit more from nature contact than the more advantaged². However, the state of the learning research is not advanced or rigorous enough to provide information about who may benefit most from nature exposure, and why.

WHO: U of MN, U of IL Urbana Champaign, Garlough Environmental Magnet School, Dodge Nature Center

HOW:

Within subjects experimental design. 100 4th graders. Biweekly nature-based and classroom-based science instruction by Dodge naturalist, in random order, fall semester 2018. 5-6 data collection weeks. Dependent and mediating variables measured immediately after every lesson. Moderating and confounding variables measured once.



VARIABLES

Dependent:
Deep learning questions tapping understanding of science lesson, via iPad

Mediating:
Attention: ACE SAAT omissions, via iPad
Impulsivity: ACE SAAT commissions, via iPad (Uncapher)
Stress: TBD
Engagement in Learning: iPad survey (TBD)

Moderating:
SES: Free and Reduced Price Lunch status

Confounding:
Connection to Nature Index (Cheng & Monroe)

SO WHAT:

Implications for Practice, Training and Policy

A mechanistic understanding of the impact of nature-based instruction could be harnessed for greater precision in design of educational spaces, curriculum, pedagogy, and teacher preparation.

Cost efficient approach to achieving educational standards.

Though exploratory, this controlled study provides a level of rigor absent in many studies of nature and learning.

NOW WHAT:

Next Steps

- Consult advisors on assessment of engagement, stress and designing deep science learning questions – February.
- Parent/student information nights and consent process – Spring.
- Pilot testing of procedures – Spring.
- Teachers, naturalist, and researchers design science curriculum – summer.
- Launch data collection – September.

¹ For example, Strife, S. and Downey, L. (2009). Childhood development and access to nature: A new direction for environmental inequality research; Williams, D. R. and Dixon, P. S. (2013). Impact of garden-based learning on academic outcomes in schools: Synthesis of research between 1990 and 2010
² For example, Nichani, et al., (2017). Green space and pregnancy outcomes: Evidence from Growing Up in New Zealand