What are the effects of garden-based learning on academic outcomes?



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Overview First: Rationale—why *academic* outcomes?

Second: Evidence: Synthesis, 20 yrs of RESEARCH Studies. Recent, longitudinal case study, 2014+

Third: Examples of two academic subjects: Science and Language Arts – to get the "pulse" of student engagement in garden-based learning

Fourth: How to maximize garden-based learning, 7 Pedagogical Principles: Acronym: GARDENS

Why academic interests in GBL?

Resurgence of interest in gardens for learning/ convergence of public concerns across the globe:

> Food insecurity

- Health Diabetes 2, obesity, stress, nature deficit
- Disengagement from education/schools-dropout; irrelevance of education from real-life

Since they are often on <u>school grounds and/or</u> <u>involve school children</u>, opportunity to use gardens to connect with *academic* learning ≻ Validity and Legitimacy

When garden-based learning works

- Garden-based learning is an instructional strategy that utilizes gardens as the milieu for learning.
- "It encompasses programs, activities and projects in which the garden is the foundation for <u>integrated</u> learning, <u>in and</u> <u>across disciplines</u>, through active, engaging, real-world experiences."

Desmond, Grieshop, & Subramaniam, 2002

Evidence?

What are the effects of garden-based learning on academic outcomes? Synthesis of research, 1990-2010 co-author, P. Scott Dixon

Williams, D. R., & Dixon, P.S. (2013). Impact of gardenbased learning on academic outcomes in schools: Synthesis of research, 1990-2010. *Review of Educational Research*. *doi:10.3102/0034654313475824* Garden-based learning: What are the outcomes?

• Grades, test scores linked with curriculum/subjects showed results for

> Science, Language Arts, Math Writing, Social Studies

Garden-Based Learning: Indirect Academic Outcomes – <u>sample</u>

Sense of curiosity and wonder
Multi-sensory learning
Food literacy & healthy eating habits
Physical activity
School bonding, community
Motivational engagement

Outcomes for Science A Case Study

National Science Foundation Project, 2014-2017 Science in the Learning Gardens (SciLG) Portland State University, Portland, Oregon <u>https://sites.google.com/a/pdx.edu/science-in-the-learning-gardens-scilg/</u>

Grades 6-7-8, 113 students Longitudinal study Curriculum design Model of Motivation: Self-Determination Theory



Self–Determination Theory: Model



Skinner, E. A., Chi, U., & the Learning-Gardens Educational Assessment Group (2012). Intrinsic motivation and engagement as "active ingredients" in garden-based education: Examining models and measures derived from self-determination theory. *Journal of Environmental Education*, 43(1),16-36.

Research Questions

Do students' experiences (of relatedness, competence, autonomy and purpose, engagement and re-engagement) in SciLG gardening activities predict four science outcomes (science identity, science class engagement, science learning, and science class grades)?

Do effects of experiences in SciLG gardening activities in the Spring term predict the four science outcomes in the next Fall term? Promising results 6th to 7th grades on-going longitudinal study

Watch the video here: http://stemforall2017.videohall.com/presentations/914

CURRICULUM INTEGRATION

PEDAGOGY

Sit spots: 10 mins

- Learning to pay attention and be mindful
- Away from distractions
- Observe; sensitize the senses
- Find a special place; be comfortable, just be still and quiet
- Lessons of nature seep in; the experience feels private

"It was very silent and calming...I like the sit spot because it gives me time to collect myself and think about things."



#1 Groundedness/Cultivating a sense of place

2 Awe/ Sense of Curiosity and Wonder

3 Discovering Rhythm and scale

Source: Williams, Dilafruz & Brown, Jonathan (2011). Learning Gardens and Sustainability Education: Bringing Life to Schools and Schools to Life. NY: Routledge

#4 Valuing Diversity

5 Embracing Practical Experience

#6 Nurturing interconnectedness

#7 Awakening the Senses

Source: Williams, Dilafruz & Brown, Jonathan (2011). Learning Gardens and Sustainability Education: Bringing Life to Schools and Schools to Life. NY: Routledge Question: What theories can drive garden- based learning?

Constructivism **Multiple Intelligences Developmental Theories (such as Self-Determination Theory**) **Ethic of Care Experiential Learning**



LEARNING GARDENS

INO LIFE TO SCHOOLS AND SCHOOLS TO LIFE

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