

Minnesota Elementary School Gardens: *Connecting Children to Nature*

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Introduction

"Nature-deficit disorder" and the "bubble-wrap generation" address how children today are removed from nature. Some possible causes of this removal include technology substituting outdoor activities, parents uncertainty of outdoor safety, and stricter policies in schools to meet academic science standards. This project examines how hands-on-experiences in nature can increase students awareness and appreciation of it. For the purpose of this project the hands-on-practices in nature are referred to as Extension of Environmental Education (EEE). Can school gardens effectively and sustainably be used by elementary schools to provide students experience with nature and still meet school curricula standards? Despite the lack of quantitative data, qualitative data suggests that school gardens improve students' understanding of nature. School gardens could effectively and sustainably provide students hands-on-experiences to connect them to the environment while meeting school science standards.

Methods

After analyzing scholarly articles and school science standards a number of goals and tools were developed for this project to determine if school gardens can connect students to nature. My experience as a garden intern during summer 2013 allowed me to learn from teachers and community members about benefits and barriers of school gardens.

Analysis: According to a study conducted by Williams and Dixon, school gardens benefit students directly and indirectly. School gardens have a positive impact on students' attitude toward gardening and the environment.

Goals: In order to determine the most appropriate Extension of Environmental Education for elementary schools the following goals are provided:

1. To promote knowledge of science curriculum and lessons provided by Minnesota Next Generation Science Standard.
2. To allow students to connect to nature with science curriculum emphasizing environmental education.
3. To give students hands-on-experience in nature to strengthen knowledge of science and the environment.
4. By providing hands-on experience, students' environmental literacy increases.
5. The practice will be effective and sustainable for the school district, educators, students, and community.

Tools: Figure 2: The Minnesota Education Analysis Tool was developed for this project to demonstrate the application of Extensions of Environmental Education, such as gardens, as a hands-on-experience for Minnesota elementary students. The potential benefits of school gardens include increased performance in science and positive attitude towards and understanding of nature.

Sources:
Aucoin, P.J. "Discovering Sense of Place: Application through Education." 23, no. 3 (March 2011): 14-18.

Bucklin-Sporer, Arden, and Rachel Kathleen Pringle. *How to Grow a School Garden: A Complete Guide for Parents and Teachers*. Portland, Oregon: Timber Press, 2010.

Hollweg, K. S., J. R. Taylor, R. W. Bybee, T.J. Marcinkowski, W.C. McBeth, and P. Zoido. "Developing a Framework for Assessing Environmental Literacy." (2011): 1-122.

Williams, D. R., and P. S. Dixon. "Impact of Garden-Based Learning on Academic Outcomes in Schools: Synthesis of Research between 1990 and 2010." *Review of Educational Research* 83, no. 2 (Jun 2013): 211-35.

"Minnesota Department of Education." 2013. Accessed September 10, 2013. <http://education.state.mn.us/MDE/Welcome/index.html>.

School Gardens

School gardens allow students to access nature and develop an understanding of the environment. American philosopher John Dewey argued in 1930 that outdoor education is ideal for a child's elementary school experience (Aucoin). The movement to educate students outside of a classroom intrigued other philosophers and educators to explore the benefits of using gardens as a tool for learning. There are different types of gardens such as garden pots, vertical vegetable gardens, rooftop gardens, native plant gardens and vegetable gardens that can serve any school and its financial, spatial, and environmental needs. The best garden design for a school is determined by these needs and the available resources to begin and maintain a garden.

Data

Dalifruz R. Williams and P. Scott Dixon from Portland State University analyzed 48 studies that discussed the impacts school gardens from 1990 to 2010 had on students. Fourteen studies described the effects school gardens had on students' knowledge of science; "Science had the highest proportion of positive effects, with 14 (93%) of the 15 results in positive effects." (Williams, Dixon p. 219). These studies are not deterministic but they show how school gardens can positively effect students. Figure 1 shows other outcomes from Williams and Dixons' study including how school gardens impact students attitude towards learning, gardening and the environment.

	Positive impact (row %)	No Impact	Negative Impact	Total Studies
Direct Academic Outcomes				
Science	14 (93)	1 (7)	0 (0)	15
Indirect Academic Outcomes				
Self-Concept	6 (60)	4 (40)	0 (0)	10
Attitude toward academics	9 (100)	0 (0)	0 (0)	9
Life Skills	4 (100)	0 (0)	0 (0)	4
Motivation	3 (100)	0 (0)	0 (0)	3
Other Outcomes				
Attitude toward gardening	14 (100)	0 (0)	0 (0)	14
Environmental empathy	10 (77)	2 (15)	1 (8)	13
Growing food	11 (92)	1 (8)	0 (0)	12
Nutrition attitudes	8 (80)	2 (20)	0 (0)	10

Figure 1: *Modified table from Williams and Dixon, 2013, p. 220-221

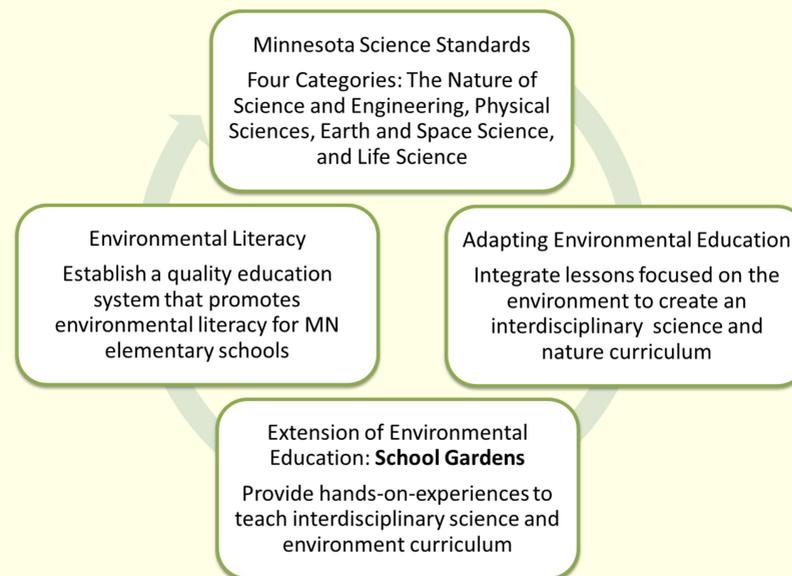


Figure 2: Minnesota Education Analysis Tool

This diagram looks at the cyclical process of integrating environment education and school gardens (EEE) with Minnesota Science Standards in order to promote students interaction with nature in reference to environmental literacy.

Terms from Figure 2:

Minnesota Science Standards: Minnesota Next Generation Science Standards 2009 were developed by a team of scientists, engineers, business representatives, K-12 teachers and education professions. The standards focus on four categories, called "strands". These include, The Nature of Science and Engineering, Physical Science, Earth and Space Science, and Life Science ("K-12 Academic Standards," 2013). School gardens can be used as an outdoor classroom for teachers to guide students through the four strands of science.

Environmental Literacy: Individuals and communities work to make informed decisions concerning the environment. This requires a knowledge and understanding of environmental concepts, problems and issues. School gardens can increase environmental literacy as children develop an interest, concern, and knowledge of nature.

Results

Barriers:

Cost: Ranges from \$200 for two 14 gallon barrel planters, soil and seeds verses \$1,000+ for raised garden beds, soil and seeds.

Space: Urban, suburban, rural school locations. Some schools have limited space to work with where others have land available to convert to a garden.

Maintenance: School teachers, custodians, parents and community members may be unwilling to commit to designing, building, watering and weeding gardens.

Benefits:

School gardens are the best form of (EEE) because of the following reasons:

1. Gardens serve educators and students as an outdoor lab that can model written curriculum presented by the Next Generation Science Standards.
2. Students' interaction with nature occurs on a regular basis, instilling sense of commitment and consistency.
3. According to the study conducted by Williams and Dixon, school gardens benefit students directly and indirectly by increasing knowledge in the sciences and positive attitude towards nature.
4. Environmental literacy and school curricula are always adapting to social, economic, and environmental standards. Gardens can facilitate these changes and still serve as an outdoor learning environment.
5. Gardens, if designed to meet the needs of the school and students' needs is a sustainable educational investment.



Image 1: O.H. Anderson Elementary Vegetable Garden Mahtomedi, Minnesota (Hayne, 2013).

Conclusion

Minnesota elementary schools should use school gardens as a hands-on-learning experience to connect students to nature. Each elementary school should consider what barriers to overcome in order to design a garden. Also, it will take initiative of the federal government, Minnesota Department of Education, educators, parents and students to assist schools in meeting science standards with school gardens. To overcome financial barriers there are school garden grant programs such as Whole Kids Foundation and Annie's Grants for Gardens. School gardens give students the opportunity to work hands-on with nature while learning science to strengthen their connection to the environment.

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