Can nature learning reduce the achievement gap in science?

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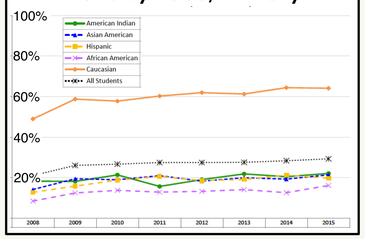
Introduction

Saint Paul Public Schools (SPPS) has one of the largest achievement gaps of any school district in the U.S. despite working aggressively to close the gap. A pilot study suggests that nature learning could be an effective strategy at closing the achievement gap in science learning.

MCA Science % Proficient Trend By Race/Ethnicity



Materials and methods

Number of Students Involved in EPA Grant Project	% Students of Color in EPA Grant Project	% Students of Color in SPPS School District
385	78%	76%

SPPS teachers partnered with Belwin Outdoor Science (BOS) for an academic year to incorporate nature-inspired learning into their curricula. Teachers attended professional development at BOS Science focused on the "Three C's"

- Content connected to standards
- Classroom management outdoors
- Comfort for students outdoors

Teachers taught at least three and up to twenty outdoor lessons throughout the school year.

Acknowledgments

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Thank you Geoff Urban for interviewing teachers and students. Thank you Holly Miller for compiling and analyzing data.

Belwin Outdoor Science could not operate without the continued support of Belwin Conservancy.

Results

100% of participating schools increased MCA III Science proficiency* while the average score for the school district dropped.

**Science MCA scores reflect many teaching strategies throughout the students' school year.*

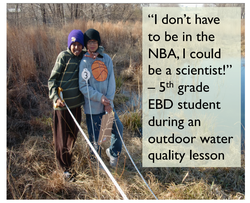
Examples of outdoor lessons delivered by participating teachers:

- Engineering a rain garden to reduce storm water runoff.
- Math: Surface area and volume of a pond
- Tree Inventory: "World is a measurable place" perimeter of pond, height of trees, circumference of tree trunks
- Structure and functions of plants and animals
- Ecological relationships
- Cycle of life of living things
- Semester-long climate survey

Race	Number of Students Interviewed	% of Students Interviewed	% District Students
American Indian	5	21%	2%
Asian American	3	13%	31%
Hispanic/Latino	2	8%	14%
African American	7	29%	30%
Caucasian	7	29%	24%
Total	24	101%*	101%*
Students of Color Total	17	71%	75%

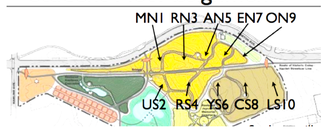
2,700 student experiences outdoors

96% of students interviewed described what they learned outdoors up to *8 months after the lesson*. Many described the experiments they did and observations they made.



"[I am] seeing kids in a whole new light. Kids that have hard time sitting and listening usually rise to the occasion outside. They are on task outside."
- Mrs. Swenson, 2nd grade teacher, American Indian Magnet School

Student Plot Assignments



"We liked learning about how the environment works, what lives outside and where their habitats are."
- Darynaisha, SPMA 5th grade

89% of students interviewed would prefer to spend more time learning outside. "There is a lot of things I haven't see out there."
- 2nd grade student, American Indian Magnet School

Literature cited

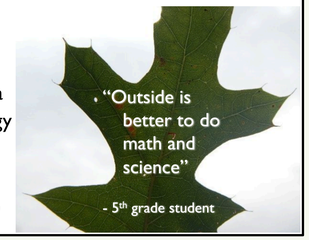
American Institutes for Research "Effects of Outdoor Education Programs for Children in California" (2005)

Dhanapal, S., Lim, C. C. Y., "A comparative study of the impacts and students' perceptions of indoor and outdoor learning in the science classroom" Asia-Pacific Forum on Science Learning and Teaching, 14(2), 1 - 23 (2013)

Kuo, Frances E. and Andrea Faber Taylor "A Potential Natural Treatment for Attention-Deficit/Hyperactivity Disorder: Evidence From a National Study" Am J Public Health. September; 94(9): 1580–1586 (2004)

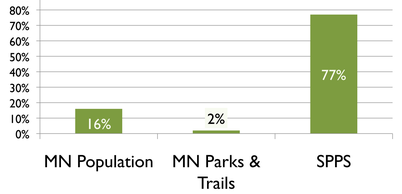
Big Idea

Connecting students to nature could be a successful strategy to reduce the achievement gap



Conclusions

The achievement gap is better defined as an opportunity gap. Students of color have fewer opportunities to learn and play outside when compared to their white counterparts



Perhaps it is not a surprise to learn that urban students in outdoor science programs improved their science testing scores by 27% (AIR, 2005). Students are more engaged in science when it is taught outside (Dhanapal, 2013). And disruptive behaviors associated with ADHD decline when students are involved in green, outdoor activities (Kuo and Faber Taylor, 2004). The data are clear. Urban students learn more outside.

Top three take-home strategies learned by Belwin's EPA Grant partner teachers:

1. Teach outdoors with greater frequency
2. Utilize schoolyard space more often
3. Go to the garden or plant a garden