

RESEARCH

Kids and Classrooms: Why Environment Matters

Rundown schools-- with no windows or green views—result in lower test scores.

Bergland, Psychology Today, Jan2016.

Impact of Views to School Landscapes on Recovery From Stress and Mental Fatigue

- The effect of window views on attention and stress were tested using randomized controlled experiment.
- Window views to green landscapes promote high school students' attention restoration.
- Window views to green landscapes speed high school students' recover from stress.
- Attention restoration and stress recovery are separate pathways.
- Exposure to daylight alone did not improve student performance.

Li and Sullivan, Landscape and Urban Planning, April2016.

The Cognitive Benefits of Interacting With Nature

We compare the restorative effects on cognitive functioning of interactions with natural versus urban environments. Attention restoration theory (ART) provides an analysis of the kinds of environments that lead to improvements in directed-attention abilities. Nature, which is filled with intriguing stimuli, modestly grabs attention in a bottom-up fashion, allowing top-down directed-attention abilities a chance to replenish. Unlike natural environments, urban environments are filled with stimulation that captures attention dramatically and additionally requires directed attention (e.g., to avoid being hit by a car), making them less restorative. We present two experiments that show that walking in nature or viewing pictures of nature can improve directed-attention abilities as measured with a backwards digit-span task and the Attention Network Task, thus validating attention restoration theory. | *Berman, Jonides and Kaplan, ResearchGate, January 2009*

Do Experiences With Nature Promote Learning? Converging Evidence of a Cause-and-Effect Relationship

In academic contexts, nature-based instruction outperforms traditional instruction. The evidence here is particularly strong, including experimental evidence; evidence across a wide range of samples and instructional approaches; outcomes such as standardized test scores and graduation rates; and evidence for specific explanatory mechanisms and active ingredients. Nature may promote learning by improving learners' attention, levels of stress, self-discipline, interest and enjoyment in learning, and physical activity and fitness. Nature also appears to provide a calmer, quieter, safer context for learning; a warmer, more cooperative context for learning; and a combination of "loose parts" and autonomy that fosters developmentally beneficial forms of play. It is time to take nature seriously as a resource for learning – particularly for students not effectively reached by traditional instruction. | *Kuo, , Barnes, and Jordan, Frontiers in Psychology, Feb2019.*

Might School Performance Grow on Trees? Examining the Link Between "Greenness" and Academic Achievement in Urban, High-Poverty Schools

In the United States, schools serving urban, low-income students are among the lowest performing academically. Previous research in relatively well-off populations has linked vegetation in schoolyards and surrounding neighborhoods to better school performance even after controlling for important confounding factors, raising the tantalizing possibility

that greening might boost academic achievement. This study extended previous cross-sectional research on the “greenness”-academic achievement link to a public school district in which nine out of ten children were eligible for free lunch. In generalized linear mixed models, Light Detection and Ranging (LiDAR)-based measurements of green cover for 318 Chicago public schools predicted statistically significantly better school performance on standardized tests of math, with marginally statistically significant results for reading—even after controlling for disadvantage, an index combining poverty and minority status. Pupil/teacher ratio %bilingual, school size, and %female could not account for the greenness-performance link. Interactions between greenness and Disadvantage suggest that the greenness-academic achievement link is different for student bodies with different levels of disadvantage. To determine what forms of green cover were most strongly tied to academic achievement, tree cover was examined separately from grass and shrub cover; only tree cover predicted school performance. Further analyses examined the unique contributions of “school tree cover” (tree cover for the schoolyard and a 25 m buffer) and “neighborhood tree cover” (tree cover for the remainder of a school’s attendance catchment area). School greenness predicted math achievement when neighborhood greenness was controlled for, but neighborhood greenness did not significantly predict either reading or math achievement when school greenness was taken into account. Future research should assess whether greening schoolyards boost school performance. | *Kuo, Browning, Sachdeva, Lee and Westphal, Frontiers in Psychology, 25 September 2018*

Classrooms With Nature Views: Evidence of Differing Student Perceptions and Behaviors

Viewing peaceful natural environments has been shown to restore cognitive abilities and reduce physiological arousal. As such, visual access to the natural environment is becoming more commonplace in built environments. One exception to that trend is in educational settings where windowless classrooms are used to reduce outside distractions. The current study examines differences across multiple sections of a college writing course in two types of identically designed classrooms—those with a view of a natural setting and those with a view of a concrete retaining wall. Results showed that students in the natural view classrooms were generally more positive when rating the course. Students in the natural view condition also had higher end of semester grades, but no differences in attendance were observed between conditions. Such findings suggest that classrooms with natural views offer advantages and also suggest that the inclusion of natural elements in courses could facilitate positive perceptions and better grades.

| *Benfield, Rainbolt, Bell, and Donovan Sage Journals August 2013*

More tree canopy is linked to higher reading test scores

This study explored relationships between environmental variables (tree cover, vegetated land covers, water) on and around school grounds in an urban area and school-level academic performance. Schools with higher levels of tree canopy tended to have higher reading test scores, lending support for increasing tree cover around schools as a way to improve academic success. | *Hodson & Sander, 2017. Green urban landscapes and school-level academic performance.*

Students were more engaged and less distracted after lessons in nature vs. classroom

A mini-experiment was replicated 20 times to see if lessons in nature have positive

aftereffects on third-grade student engagement in subsequent indoor instruction. Results showed significantly better engagement after lessons in nature than after carefully-matched lessons indoors. This nature advantage held across two teachers and persisted across 10 weeks and different instructional topics. | *Kuo et al. 2018. Do lessons in nature boost subsequent classroom engagement: Refueling students in flight.*

Surrounding greenness and air quality are associated with chronic absenteeism in schools

Schools in low-income communities tend to have higher chronic absenteeism than other schools. For Massachusetts schools in this study, higher surrounding greenness was associated with lower absenteeism; and higher ambient particulate matter (air pollution) was associated with higher absenteeism. These effects held even when race and income were accounted for. | *MacNaughton et al. 2017. Impact of particulate matter exposure and surrounding "greenness" on chronic absenteeism in Massachusetts public schools.*

Preschool children tend to use richer language in a natural environment than in indoor or outdoor classrooms

This case study found that the qualities of young children's utterances in three settings (indoor classroom, outdoor classroom, natural environment) differed according to environment. Language – especially in the use of verbs and adjectives -- was richer in the natural environment, suggesting higher activity levels and greater excitement of children in the natural environment. | *Richardson & Murray, 2017. Are young children's utterances affected by characteristics of their learning environments? A multiple case study.*

Tree cover and species composition may improve children's academic performance, especially for those in socio-economically challenged schools

Academic performance data from over 300 schools was examined in relation to tree cover, tree diversity, and tree species around the schools. Findings support previously-documented associations between academic performance and "greenness," but also found tree cover to be a more pronounced predictor of academic performance than other vegetation types, especially for schools with the highest level of external challenges.. | *Sivarajah, Smith & Thomas, 2018. Tree cover and species composition effects on academic performance of primary school students.*

Students Learn Better With Views of Trees

What if what is outside a school's windows is as critical to learning as what is inside the building? A fascinating new study of high school students in central Illinois found that students with a view of trees were able to recover their ability to pay attention and bounce back from stress more rapidly than those who looked out on a parking lot or had no windows. | *Sullivan and Li, The Dirt 2016*

Additional Research is available through the following libraries:

Children & Nature Network:

https://www.childrenandnature.org/learn/research/?utm_source=Research+Digest+December+2017&utm_campaign=October2017+Research+Digest&utm_medium=email

North American Association of Environmental Educators:

<https://naaee.org/eepr/research/library>