EXECUTIVE SUMMARY

How Green Schoolyards Create Economic Value

Rob Grunewald, Economics and Public Policy Consultant

SOUTHMOOR ELEMENTARY, DENVER. PHOTO COURTESY OF DESIGN CONCEPTS.

About the author

Rob Grunewald is an independent economics and public policy consultant. Previously he held economist and analyst positions at the Federal Reserve Bank of Minneapolis from 1993 to 2022. Grunewald has authored over 200 articles and reports on topics ranging from regional economic conditions and banking to education and early childhood research and policy, including a widely cited 2003 paper with Arthur Rolnick, *Early Childhood Development: Economic Development with a High Public Return.* He holds an M.S. in Applied Economics from the University of Minnesota and a B.A. in Economics and Religion from St. Olaf College. Grunewald lives on a rural homestead in northwest Wisconsin with his wife and daughter.

Acknowledgements

Much of the data and analyses of this report are based on *An Analysis of Learning Landscapes: Lessons Learned for a National Movement* by Lois Brink, chief strategist at The Big SandBox, Inc., and analysts from Autocase Economic Advisory, which estimates the effects of Denver Public Schools' Learning Landscapes on children's learning, environment, health and wellness, and school district-related economic outcomes. Peter Anthamatten, associate professor of geography and environmental sciences at the University of Colorado Denver, contributed analysis on residential property values and populations proximate to Learning Landscape schools. Children & Nature Network's Priya Cook, director of green schoolyards and communities, and Cathy Jordan, consulting director of research, advised on existing green schoolyard-related research and provided feedback on report drafts. Timothy Bartik, senior economist at the W.E. Upjohn Institute for Employment Research, provided feedback on an earlier draft. The report was commissioned by Children & Nature Network.

OAKLAND ELEMENTARY, DENVER. PHOTO COURTESY OF LOIS BRINK.

Executive Summary

Converting paved schoolyards at elementary schools to nature-filled green schoolyards creates economic value by boosting children's learning, enhancing environmental sustainability, and supporting community development and health. A green schoolyard is a nature-filled, multi-functional school ground that offers spaces to play, learn, explore, and grow. Natural elements include trees, native plants, and vegetable gardens.

During the school day children are more active on green schoolyards. This additional time spent in nature is associated with reducing stress and restoring attention span – both of which can benefit children's learning. According to results from a study of green schoolyard conversions at Denver's public elementary schools, the districtwide student mobility rate decreased 7 percentage points on average after a conversion.[1] These results are based on a quasi-experimental design that compares school-level trends prior to implementation with trends post-implementation against data from unconverted schools over the same period. Lower student mobility is associated with stronger academic achievement which, years later, can nudge high school graduation rates higher and improve employment and income outcomes.

Due to increased tree canopy and vegetation, the Denver study estimates an average 15-degree reduction in the average ambient temperature during the summer months. Across all the converted schoolyards, the study estimates average annual sequestration of nearly 1,300 tons of carbon and removal of 400 pounds of air pollutants. And based on a sample of three schools, rainwater runoff decreased by an estimated average of 241,000 gallons annually. Each of these contribute to climate change adaptation and resilience and stronger community health.

Green schoolyards have similar benefits as a neighborhood park when they are open to the community after school hours, including weekends and summers, like they are in Denver. As reflected in research on community parks, green schoolyards are associated with increased residential property values and local property tax revenue, community cohesion, and public safety. They also facilitate increased physical activity and can positively affect mental health for all ages, reducing the risks of costly chronic diseases.

A green schoolyard conversion moves indicators across several different sectors and therefore doesn't depend on gains in just one domain to achieve robust value. Furthermore, many

CONSERVATORY GREEN MIDDLE SCHOOL, DENVER. PHOTO COURTESY OF DESIGN CONCEPTS.

[1] The Big SandBox, Inc., & Autocase Economic Advisory. (2023). *An Analysis of Learning Landscapes: Lessons Learned for a National Movement.* Grant report commissioned by Children & Nature Network. Student mobility rate refers to the percentage of students who leave a school during the school year.

Executive Summary

of the benefits accrue not only to the children who attend schools with green schoolyards, but to society as a whole, a condition that generally leads to underinvestment. Schoolyard conversions also have implications for equity, as paved schoolyards are more concentrated in low-income and racially and ethnically diverse urban neighborhoods.

This report reviews research on the effects of green schoolyard conversions, identifies outcomes with economic implications, converts those outcomes to dollar values, and compares the sum of those values with the cost of a green schoolyard conversion. Additional research is needed to fully estimate the economic value of green schoolyard benefits relative to costs. However, across statistical estimates of environmental sustainability outcomes and local property tax revenue increases, 60 cents are returned for every dollar invested.

Economic effects on children's learning and community health are also likely considerable. Since statistical estimates are not available, a hypothetical example is included for each domain. A modest gain in either the high school graduation rate or improvements in community health would produce a positive return on investment, that is, a ratio of benefits-to-costs above $1 for every dollar invested. The report concludes by showing how modest gains in both high school graduation rates and community health could achieve a return of over $3 for every dollar invested.

Prospective Economic Effects of Green Schoolyards	
Children's learning and health	Increase student achievement and high school graduation rate
	Improve children's long-term health
Environmental sustainability	Reduce air temperature
	Sequester carbon
	Remove air pollutants
	Increase stormwater capture
	Increase pollinator habitat
	Increase children's long-term sustainability behaviors
Community development and health	Increase residential property values and local property taxes
	Boost community cohesion and public safety
	Improve community physical and mental health

For information about this report, contact Rob Grunewald, robgrunewald@gmail.com.