

# Addressing a Multi-Billion Dollar Challenge: Advancing Knowledge of How High-Quality School Environments Can Positively Affect Educational Outcomes

December 2023

## 1.0 KEYWORDS

K-12, Primary and Secondary Education  
School Modernization  
Research, Design Research, Applied Research, Evidence-Based Design  
Best Practices, Design Guidelines  
Indoor Environmental Quality  
Educational Adequacy  
Community Connectivity  
American Institute of Architects College of Fellows, Latrobe Prize

## 2.0 BRIEF DESCRIPTION

Addressing the nation's inadequate school facilities is an important and necessary step toward supporting equitable educational and community improvement. With over half of all U.S. public schools in need of renovations, the cost of which totaling nearly \$200 billion, the "Addressing a Multi-Billion Dollar Challenge" study was conducted to identify the potential benefits of school modernization to help jurisdictions make a stronger case for the importance and funding of school modernization, as well as provide guidance for designers and school districts to effectively spend the forecasted billions of modernization dollars to achieve their core mission of educating children for life in the 21st century. The study's multi-disciplinary research team investigated the differences between modernized and non-modernized schools in two urban school districts in terms of Indoor Environmental Quality, Educational Adequacy, and Community Connectivity and the effect of these variables on performance and well-being outcomes. The researchers determined that, in multiple categories, modernized schools offered greater Indoor Environmental Quality and Educational Adequacy than non-modernized schools, while Community Connectivity had mixed, though favorable, results. The bottom line is, modernized schools outperformed non-modernized schools in a statistically significant manner across multiple factors. Learn more at <https://bit.ly/Billion-Dollar-Challenge>.

*The "Addressing a Multi-Billion Dollar Challenge" study was conducted by a multi-disciplinary team of researchers from the global design firm Perkins Eastman and the Drexel University School of Education. The research team also included faculty from Drexel University's Dornsife School of Public Health and the Architecture program at Drexel University's Westphal College of Media Arts and Design, along with statistical analysis by Invontics. This work was supported by the Baltimore City and District of Columbia public school districts, and done under the auspices of the Drexel-based Consortium for Design and Education Outcomes (CDEO). A grant for this study was awarded by the American Institute of Architects College of Fellows Latrobe Prize with additional funding provided by J+J Flooring.*

## 3.0 SUMMARY

An alarming disinvestment in public schools across the United States currently affects more than 49.4 million students (Digest of Education Statistics, 2022), with an estimated 53% of schools in need of renovations to be considered in good overall condition—the cost of which would total around \$197 billion (Alexander & Lewis, 2014). Educational success requires school facilities that provide healthy and safe environments (Wargocki, 2015). Thus, addressing the nation's inadequate school facilities is an important and necessary step in supporting equitable educational and community improvement.

To address this multi-billion dollar challenge of modernizing the nation's schools, a multi-disciplinary team of researchers from the global design firm Perkins Eastman and the Drexel University School of Education came together to conduct this study to advance the industry's knowledge on how high-quality school environments can positively affect educational outcomes. To do so, we explored the impact of several key areas of school modernization on various stakeholders in the Baltimore City and District of Columbia public school districts, from students and staff to community members, to better inform the decision-making about future school construction projects. Specifically, this study investigated the differences

between modernized and non-modernized schools in terms of Indoor Environmental Quality, Educational Adequacy, and Community Connectivity and the effect of these variables on performance and well-being outcomes.

Our goal was to provide specific data about the potential benefits of school modernization to help jurisdictions make a stronger case for the importance and funding of school modernization, as well as provide guidance for designers and school districts to effectively spend the forecasted billions of modernization dollars to achieve their core mission of educating children for life in the 21st century. This knowledge is of value to both school district leaders and design firms working on modernization plans for new and renovated schools, as well as providing thoughtful and convincing information for the decision-making around and advocacy for school modernization on a national scale.

The study, funded in part by the American Institute of Architects College of Fellows Latrobe Prize plus additional funding by J+J Flooring, used an explanatory sequential mixed methods design. We collected data in over two dozen schools, including on-site measurements of Indoor Environmental Quality, visual assessments of school environments, stakeholder questionnaires and interviews, and analysis of community and school/district archival data.

Our analysis revealed that the modernized schools outperformed non-modernized schools in a statistically significant manner across multiple factors. In terms of Indoor Environmental Quality, modernized schools had greater thermal comfort, better air quality in terms of reduced particulate matter, lower background noise levels, and better daylighting. Modernized schools also came out ahead on several Educational Adequacy categories, including the provision of a more positive first impression, an enhanced learning ambiance, and more safety strategies than non-modernized schools. When it came to Community Connectivity, results were mixed, though a modernized building was understood to enhance the good work schools are already doing. We also found evidence that school modernization has a significant positive impact on key educational indicators, including test scores, graduation rates, and enrollment over time. The bottom line is that modernized schools produce better outcomes.

This study demonstrates that modernized learning environments improve their occupants' well-being and satisfaction; and the modernization process enhances community engagement and connectivity. As school districts strive to enhance educational outcomes, continued investment in the quality of the school's educational environment plays a critical role in achieving that goal. By introducing planning and design strategies focused on improving areas within the variables of Indoor Environmental Quality, Educational Adequacy, and Community Connectivity, districts can derive the most value from continued and enhanced investment in modern and modernized learning environments, thereby preparing students for success in the 21st century.

Learn more about our study at <https://bit.ly/Billion-Dollar-Challenge>.

## With Thanks



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*Additional thanks to the study's advisory committee, school district representatives, and data collection assistants, all of whom are listed in the full report.*