Can renovations or new construction really improve student health and achievement? Do the outcomes actually justify the taxpayer expense? These recurring questions, often posed by school board members and community residents, can stir debate and obstruct consensus. For those in support of devoting significant funds to renovations or new construction, a response backed by strong evidence is especially crucial.

The McGraw-Hill Research Foundation published, *The Impact of School Buildings on Student Health and Performance: A Call for Research*, to strengthen the understanding of the connection between school buildings and student health and learning. This paper uniquely classifies the latest research by how we see, breathe, feel, hear, move, think and learn.

As defined by Dr. Lorraine Maxwell, an associate professor at Cornell University and an expert on the topic of school facilities and achievement, there are a set of psychological processes that are impacted by building design, including cognition, attention, motivation, and emotional affect. Supported by Maxwell’s research in addition to that of many other field experts, when the physical state of a school building compromises how students see, breathe, feel, hear, move, think and learn, a student’s cognition, attention, motivation, and emotional affect can suffer. Furthermore, teacher performance and retention, community engagement, and school leadership declines.

By categorizing relevant statistics and inferences by each of the six types of experiences, the link between school buildings and student outcomes is strengthened, serving as evidence in favor of pursuing school building renovations or new construction.

1. **SEEING**
   - Natural daylight offers the most positive effect on student learning by increasing concentration and learning, reducing student absenteeism and improving test scores.¹⁻⁴
   - Students with limited classroom daylight were outperformed by those with natural daylight by 20 percent in math and 26 percent in reading.¹⁻⁵
   - Students with plenty of daylight in classrooms learn up to 21 percent more than those with less daylight.⁶

2. **BREATHEING, FEELING, AND HEARING**
   - Ventilation, air supply, thermal comfort, and acoustics and noise affect a student’s information retention, concentration, mental task speed and completion, testing, general performance, general comfort and daily attendance. These effects can be negatively impacted by the following sources: Windowless classrooms; antiquated mechanical systems; poor separation between classrooms; and background noise.²⁻⁷⁻¹⁵
   - Many classrooms have a speech intelligibility rating of 75 percent or less, which means listeners with normal hearing can understand only 75 percent of words from a list.¹

3. **MOVING**
   - Undersized classrooms and circulation can contribute to excessive levels of stimulation, cognitive fatigue and less pro-social behavior.⁵⁻¹⁶
   - Undersized classrooms and inadequate furniture debilitate routinely re-organizing classrooms in response to engaged learning and 21st Century Learning.¹⁻¹⁷
   - Overcrowding can augment negative student behavior and poor performance.²

4. **THINK AND LEARN**
   - The least quantitative, though significant in turning around an individual or a student body at large, is sense and pride. Small schools promote positive student engagement, attainment and well-being.¹⁸
   - Introducing public space, such as a commons, can foster community and family engagement, resulting in a sense of unity and belonging, as well as improved student behavior and achievement.¹⁹⁻²⁰
   - The concept of aesthetics is often misunderstood as how something looks or appears. Aesthetics in the context of schools is how the building appeals to the senses and emotions of students, staff, and faculty.⁶
   - Color has the power to influence the performance of its occupants, as it is the most immediate form of nonverbal communication.¹
   - Schools that are engaging and vibrant foster a sense of belonging that is important for all kids, especially those at risk.¹
   - A study of the District of Columbia School system found that after controlling for other variables such as a student’s socioeconomic status, standardized achievement scores were lower in schools with poor building conditions.²¹

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planning, construction management, and energy services. This sole-source project delivery capability distinguishes their firm as one that simplifies the design and construction process, streamlines communication, and efficiently advances projects from conception to completion. With this unified technical capacity, their creative professionals can focus their attention on creating meaningful places to live, learn, and work.

BIBLIOGRAPHY


