



# The Importance of School Facilities in Improving Student Outcomes

## Introduction

A growing body of research has found that school facilities can have a profound impact on both teacher and student outcomes. With respect to teachers, school facilities affect teacher recruitment, retention, commitment, and effort. With respect to students, school facilities affect health, behavior, engagement, learning, and growth in achievement. Thus, researchers generally conclude that without adequate facilities and resources, it is extremely difficult to serve large numbers of children with complex needs.

According to the US General Accounting Office (GAO) almost three-fourths of existing US schools in 1996 was constructed before 1970. Of these schools, about one-third of schools had need of extensive repair or replacement and almost two-thirds had at least one inadequate building feature such as substandard plumbing, roofing, or electrical systems. Moreover, 58-percent had at least one unsatisfactory environmental condition such as inadequate ventilation, acoustics, or physical security.

Besides general maintenance and construction issues, researchers have found most schools lack 21st century facilities in the form of infrastructure, laboratories, and instructional space. More than half do not have sufficiently flexible instructional space for effective teaching to take place.

Thus, facility quality is an important predictor of teacher retention and student learning. The physical and emotional health of students and teachers depend on the quality of the physical location, which makes establishing safe, healthy buildings essential.

## The Impact of Facilities

Improving the quality of school facilities is an expensive undertaking. However, when the positive impacts of facility improvement on teachers and students are translated into dollar figures, the rewards of such investments far outstrip the cost of the investments. There are five primary facets of school facilities: acoustics/noise, air quality, lighting, temperature, and space. These are addressed below.

### Acoustics and Noise

Noise levels greatly affect teacher and student performance. In fact, excessive noise causes dis-satisfaction and stress in both teachers *and* students. Research has found that schools that have classrooms with less external noise are positively associated with greater student engagement and achievement compared to schools with classrooms that have noisier environments. Thus, building schools that buffer external noise from classrooms can improve student outcomes.

### Air Quality

Indoor air quality is also a concern because poor air quality is a major contributor to absenteeism for students with asthma. Research also indicates that many schools suffer from "sick building syndrome" which affects the absenteeism and performance of all students. Moreover, bacteria, viruses, and allergens that contribute to childhood disease are commonly found in schools with poor ventilation systems.

Indoor pollutants are also emitted from office equipment, flooring materials, paints, adhesives, cleaning products, pesticides, and insects. All of these environmental hazards can negatively affect children, particularly in schools with poor ventilation systems.

### Lighting

Before the advent of cheap electricity, schools often relied on natural lighting. As electric power costs declined, the amount of artificial light used in schools increased. Research has shown that artificial lighting has negative impacts on those in schools while natural lighting has positive impacts. In fact, research has shown that not only does classroom lighting boost the morale of teachers and students, appropriate amounts of natural lighting also reduces off-task behavior and improves test scores. One study found that students with the most exposure to natural daylight progressed 20% faster in math and 26% faster in reading than students who were taught in environments with the least amount of natural light.

### Proper Temperature and Control of Temperature

One consistent research finding across individuals of all ages is that the temperature in which a person works affects engagement levels and overall productivity—including student achievement. Anyone that has worked in a classroom or office that is too hot or too cold knows how difficult it can be when trying to work when the temperature is uncomfortable. According to the best analyses, the ideal temperature range for effective learning in reading and mathematics is between 68° and 74°.

To maintain such a temperature in every classroom within a school, teachers typically need to be able to control the temperature in their own classroom. At the very least, teachers should be able to control the temperature of small blocks of classrooms that receive the same amount of sunlight and have similar exposures to outside temperatures.

### Classroom Size and Space

Overcrowded classrooms—and schools—have consistently been linked to increased levels of aggression in students

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Overcrowded classrooms—and schools—have consistently been linked to increased levels of aggression in students. Overcrowded classrooms are also associated with decreased levels of student engagement and, therefore, decreased levels of learning.

Alternatively, classrooms with ample space are more conducive to providing appropriate learning environments for students and associated with increased student engagement and learning. Classroom space is particularly relevant with the current emphasis on 21<sup>st</sup> century learning such as ensuring students can work in teams, problem solve, and communicate effectively. Classrooms with adequate space to reconfigure seating arrangements facilitate the use of different teaching methods that are aligned to 21<sup>st</sup> century skills. Creating private study areas as well as smaller learning centers reduces visual and auditory interruptions, and is positively related to student development and achievement.

### Twenty-First Century Learning

Policymakers, educators, and business people are now focused on the need to ensure that students learn 21<sup>st</sup> century skills such as teamwork, collaboration, effective communication, and other skills. As noted above, older buildings simply are not conducive to the teaching of 21<sup>st</sup> century skills. This is particularly true with the respect to reconfiguring seating arrangements to facilitate various modes of teaching and learning and the use of technology in the classroom as a mode of teaching and learning.

### Conclusions

A large body of research over the past century has consistently found that school facilities impact teaching and learning in profound ways. Yet state and local policymakers often overlook the impact facilities can play in improving outcomes for both teachers and students. While improving facilities comes at a financial cost, the benefits of such investments often surpass the initial fiscal costs. Policymakers, thus, should focus greater attention on the impacts of facilities and adopt a long-term cost-benefit perspective on efforts to improve school facilities.

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