

THE IMPACT OF CLEANING ON K-12 EDUCATION

A Study Into The Heavy Reliance Academic Success, Student Attendance, and Educator Efficacy Has On The Cleanliness Of Schools

The Impact of Cleaning and Facilities on Education

The goal of this white paper is to share research on how the building conditions and daily maintenance & cleaning activities conducted by operations teams have a fundamental impact on core academic goals of our school districts from student attendance & achievement to teacher happiness and retention.

This white paper will outline the following (with section page number):

- **3** Key Research Findings in this Report
- **4** The Current State of School Buildings
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Research Findings on Impact of Cleaning for Education

This research report discusses the research documenting the impact of facilities maintenance and cleaning has on key district goals and priorities that are critical to the core mission of schools. These include:

Enhancing Academic Achievement: Research has shown that building conditions are directly linked to student achievement. Results showing correlations between the condition of school facilities and student outcomes are consistent across grade levels and subject areas.

Raising Attendance: Well-maintained facilities and indoor air quality are strongly linked to higher student attendance and lower drop-out rates, with minority students and students from families living with low income most impacted. Improvements to facility conditions and cleanliness can serve as a powerful intervention to mitigate chronic absence.

Raising Student Cognitive Health: Increased air quality and ventilation systems impact many cognitive abilities that are core to learning including student concentration, response time, and accuracy.

Improving Teacher Retention & Efficacy: The state of school facilities impacts teacher morale, retention, and efficacy. Substandard facilities correspond with higher teacher turnover, decreased levels of engagement, and lower overall success for teachers and staff.

Extending Building Life Cycles: Extending the usable life of a facility has significant positive benefits. Regular maintenance, including cleaning, saves districts money over time and mitigates the need for and impact of significant repairs.

School Building Portfolios Are Aging

Structurally sound and wellmaintained schools can help students feel supported and valued. Students are generally better able to learn and remain engaged in instruction, and teachers are better able to do their jobs, in well-maintained classrooms that are well-lit, clean, spacious, and heated and air-conditioned as needed. In contrast, when classrooms are too hot, too cold, overcrowded, dust-filled, or poorly ventilated, students and teachers suffer.

School Facilities are the Foundation for Success

A decade ago, this assessment from the U.S. Department of Education acknowledged the critical and foundational role school facilities play in teaching, learning, and student success. The words–and the gravity of them–still hold true today.

- The school environment is the setting for all things that happen in schools.
- The condition of a school building affects nearly every stakeholder in a school community.
- The cleanliness of the environment sets the tone for how families perceive the quality of care their children receive.

For Families

Families need to know that their children are in safe, clean environments. It impacts the community perceptions of each school housed within their neighborhood. Neighbors and community businesses want schools that are wellkempt and add value to a neighborhood.

For Educators

The school building is where teachers and students spend large portions of their lives. Classrooms are like a second home for educators; they move around as they teach, create spaces for different learning activities and styles, and need to know they can focus on student academic learning, the development of life skills, and social and emotional wellbeing rather than have concerns about the safety of the environmental conditions.

For Students

And for students, schools and classrooms are mini-ecosystems. In order for them to fully engage in learning, they must be comfortable. Bad smells, poor air quality, and inadequate temperatures cause physical discomfort, distractions, and even health conditions that get in the way of learning.

In other words, if the environment is not conducive to teaching and learning, the curriculum, pedagogy, extracurricular offerings, enrichment programs, and other events simply cannot have the intended positive impact.

> School buildings built <mark>before 1970</mark> in the United States

Average Age Of US Public School Building is <mark>49 Years</mark>



*National Center for Educational Statistics -February, 2024

60 Yr

School Facilities are Aging with High Deferred Maintenance

The reality is that most of the schools across the United States are relatively older structures. With that comes additional needs in terms of maintenance and upkeep in order to ensure the creation of ideal learning environments (ILE's) for student and staff. A few facts on the matter:

- Older facilities often provide a sufficient infrastructure as "The Bones Of The Facility" if the district engages in regular cleaning and preventive maintenance.
- Important systems within the facility, (HVAC, roofing, and plumbing etc) require regular inspection for operational condition.
- Almost always, these systems have been replaced over the life of the building several times with a variety of technologies from a variety of vendors.

And within a district, each school has its own history of maintenance and periods of neglect. Typically, these are best addressed by both a regularly updated master facilities plan and an effective strategic operations system that is fed by routine and ongoing staff practices and efficient protocols to address emergent issues.

These practices help move a district from having only reactive responses to crises into a cadence of preventive maintenance.

Which once established will result in the highest quality environments with the lowest rates of unexpected issues.



Public Schools face a \$46 billion gap in spending on minimum investments needed each year to keep schools facilities at a basic level of quality

53%

of public school districts report the need to **update or replace multiple building systems**, including HVAC systems



Nationwide total of **271 billion in deferred maintenance costs** facing public schools **Enhanced Academic Achievement**

The Impact of Cleaning and Facilities on Learning & Achievement

6 A healthy learning environment can reduce the absence rate, improves test scores, and enhances pupil/teacher learning/teaching productivity."

Facility Condition & Cleanliness Directly Impacts Academic Achievement

It is not surprising that building conditions affect how individuals and groups feel about a school or school campus. A large body of research has documented that the impacts of school facilities, however, go much deeper—to the heart of school and district outcomes and success. Research over the course of decades has found strong correlations between the quality of building conditions and academic outcomes for students.

A 2002 review of research seeking to understand this relationship between facilities' condition and student and teacher success concluded that there are "significant correlations between building conditions and academic outcomes." This impact spans grade levels and subject areas–and has been documented with performance on critical state achievement tests. A 2007 study measuring the relationship between school building conditions and academic achievement on end-of-year achievement tests found that the rates of middle school students passing end-of-year state tests were higher for students in buildings that were in good condition as compared to those students in substandard buildings.

This trend held across english, mathematics, and science, with the greatest difference in scores in English, where the passing rate was a notable 6% higher for students in wellmaintained school buildings. Another study of more than 150 urban schools found correlations between the condition of the school building and outcomes in both reading and math on state test scores–with a linear decline in achievement for students in relatively more unkempt school buildings.

School Statistics	School Variable	Grades 3-5	Grades 6-8
		Mean (SD)	Mean (SD)
Performance Measures	Reading Proficiency $(\%)^{\dagger}$	63.0% (13.3)	60.7% (15.4)
	Math Proficiency (%) ^{\dagger}	45.2% (17.4)	38.6% (18.4)
	Attendance Rate	93.0% (1.7)	92.6% (3.4)
	Chronic Absence Rate $^{\dagger \dagger}$	16.6% (8.1)	18.0% (12.7)
School Environment	Facility Condition Index $(FCI)^{\ddagger}$	61.5 (26.1)	55.5 (25.8)

 Denotes the percentage of students performing at a proficient or advanced level based on standardized reading and mathematics testing
*See Reference #3

Air Quality Has the Most Significant Impact on Achievement and Learning

Research seeking to understand the relationship between building and facilities conditions and student success has spotlighted air quality as a major factor that directly correlates with student academic outcomes. Studies have shown significant impacts of air quality and ventilation on elementary student performance in core subject areas.

Other research has validated this connection and documented a direct, linear relationship between air quality and achievement outcomes, measured by test scores, in both math and reading. In other words, when air quality improves, test scores increase; as air quality deteriorates, test scores fall.

Researchers have honed in on this relationship and found that key cognitive functions that are critical to the learning process are directly affected by indoor air quality. Multiple studies have confirmed that air quality has significant impacts on students' ability to focus–a vital component to the learning process. A European study across 8 schools looked at the relationship between indoor air quality–as measured by levels of carbon dioxide–and students' performance on a test measuring their ability to concentrate. Results showed that higher rates of indoor air pollution were associated with lower rates of students' ability to focus on the material and questions being asked. Similar studies have been done in office settings and found that higher levels of particulate matter in the air and lower ventilation rates were associated with lower cognitive function including slower response times and reduced accuracy in response to simple questions.

Because of the profound impact of indoor air quality on student brain function and cognitive health, public health researchers have called on decision-makers to prioritize policies and practices that ensure children are in environments that are well-ventilated and have low rates of particulates and carbon dioxide.

Routine Cleaning & Maintenance Are Critical to Classroom Air Quality

Routine cleaning and maintenance of facilities are inevitably linked to indoor air quality. Routine cleaning helps reduce dust mites, pathogens, other allergens, and mold growth-all of which are detrimental to the quality of the air in a classroom or building. Ensuring ventilation systems are working properly and well-maintained, including cleaning filters, ducts, and vents, reduces the number of particulates in the air and promotes healthy air circulation throughout rooms and buildings. And regularly cleaning surfaces removes dirt, bacteria, and dust that can become airborne and negatively impact overall air quality.

Improved Student Attendance

The Impact of Cleaning and Facilities on Student Attendance

"A child's success in school is built upon their ability to show up. And when buildings and children are unhealthy, attendance suffers."

The Link Between Student Attendance, Funding, & Building Environments

The importance of attendance to academic achievement and student success has been well documented in research and understood by practitioners in the field. Educators are acutely aware that when students are not consistently in school, they miss out on powerful and essential developmental experiences and fall behind academically.



PERCENT OF FINANCIAL SUPPORT LOST TO ADA BASED COUNTING BY POVERTY QUINTILE (RELATIVE TO ENROLLMENT)





School districts have struggled with declining enrollments and increasing rates of chronic absence since the pandemic. Beyond the impacts this has on academic outcomes and ensuring students are engaged, enrollment and attendance rates are a key variable that determine the amount of funding schools receive from local, state, and federal governments. This is especially critical for states that use average daily attendance (ADA) to determine funding streams, with lower rates of attendance even for enrolled students directly impacting the ability of the district to fund their most foundational programs and services.

Many interventions to increase student attendance focus on providing support and reminders to the individual students and families. Though these efforts are important, research has uncovered a more systemic underlying cause of many absences—finding strong links between student attendance and the health and condition of the school buildings.

Cleanliness and Conditions Directly Impact Attendance & Dropout Rates

Research looking to identify root causes of chronic absenteeism has found significant links between school building conditions and regular attendance and persistence in school. Multiple studies across schools and districts have shown that as facility conditions decrease, chronic absence rates increase. And beyond just daily attendance rates, other studies have found that attending schools with sub-par conditions is linked to higher rates of students dropping out, and therefore, not graduating from high school.

When drilling down on what affect attendance the most, researchers have found the presence of mold, pests and vermin, and poor ventilation to be among the most critically tied to higher rates of student absence. These issues are directly linked to the cleanliness and maintenance of school buildings. With this, it makes sense that other research has found that custodial capacity and staffing has strong correlations with student attendance. A study that included the ratio of custodians per square foot found that, especially at the secondary level, students are more likely to miss school in buildings that have lower custodial and cleaning capacity.

Many schools and districts use temporary classrooms, sometimes called "portables," for schools that do not have sufficient classroom space for their student population or to house classes displaced by facilities that are in disrepair or having longer-term repairs.

Research has found that use of these temporary classrooms is also negatively correlated with measurable differences in student attendance. Lower attendance and enrollment is an oftmissed and unexpected cost of deferred maintenance and insufficient cleaning processes and staffing.

APPA Level	Sq. Footage per Custodian
Level 1: Orderly Spotlessness	8,500
Level 2: Ordinary Tidiness	16,700
Level 3: Casual Inattention	26,500
Level 4: Moderate Dinginess	39,500
Level 5: Unkempt Neglect	45,600

*APPA recommendations on staffing levels per specific quality levels. In education, APPA Level 2 is the standard. From our resource: <u>APPA Cleaning: A Guide To Data-Driven Operational Success</u>

Poor Air Quality & Insufficient Cleaning Increase Illness-Related Absences

The Environmental Protection Agency's Science Advisory Board has ranked indoor air pollution among the top five environmental risks to public health. They describe that exposure to indoor air pollution can cause coughing, eye irritation, headaches, and allergic reactions and also aggravate asthma and other chronic respiratory conditions.

Asthma is the leading cause of school absenteeism. Asthma accounts for over 14 million missed school days per year. With this backdrop, it is easy to understand the strong connection between indoor air quality and student attendance–and this relationship has been repeatedly proven in study after study. A 2020 study examining data from over 10,000 schools across the United States found a significant relationship between levels of particulate matter and absenteeism for students across the K-12 spectrum.

Students living with low income and from underserved communities are disproportionately impacted by issues with air quality and related high rates of absence. The Children's Health Fund reports that more than 10% of individuals in lowincome households have asthma, which is 1.5 times higher than individuals living in households in the highest income brackets.

This higher occurrence results from a confluence of environmental and facilities conditions in homes, socioeconomic status, and access to healthcare. Studies have confirmed the inequities in impact of poor indoor air quality in schools—that is, lower socioeconomic districts have the strongest correlations between indoor air pollution and resulting rates of chronic absence.

Efforts to improve air quality in and around schools have been shown to have the potential to dramatically improve attendance and increase associated funding for school districts.

A study examined the impact of indoor air quality in all of Massachusetts's more than 1,700 public schools. The study found that, in one school year, improvements in air quality translated to a 2.6% reduction in chronic absence rates–or 25,837 students. Another study that looked at air ventilation in 150 elementary classrooms in California determined that increasing classroom ventilation rates would result in a projected reduction of absences due to illness by 3.4%.

In California, where average daily attendance is directly tied to funding, this represents \$33 million additional funds, annually.



Enhance Teacher Retention & Efficacy

The Impact of Cleaning and Facilities on Teacher and Staff Retention and Performance

A large percentage of educators and administrators nationwide aren't satisfied with the buildings where they are tasked with facilitating learning they're too small, outdated, toxic, unconducive to instruction, and often ill-equipped for students' rapidly evolving and growing needs, they say."

Poor Building Conditions Make it Harder to Retain Teachers

The teacher shortage–and overall school district staff shortages–within the United States has been national news for the past several years. A lack of highly qualified teachers in any given school or district can be catastrophic to students' ability to engage, master standards, and be successful. Similar to other trends, higher-need schools and districts have been disproportionately hit by turnover and unfilled openings for certified teachers.

Research has shown that **the condition of classroom and school facilities directly affect a districts' ability to retain, attract, and support their teachers and staff.** When schools and buildings are perceived as inadequate, teachers and staff are less likely to feel connected to and enthusiastic about their work.

These negative working conditions have been shown to contribute to educators questioning leaving a particular school or even the field of education. A survey of urban public school teachers found that **40% of teachers who rated their school facilities at a C or below said that the conditions have led them to consider leaving the school.** Even more alarming, 30% of these teachers have thought about leaving the profession entirely. Another survey of K-12 teachers found that teachers' perception of their school facilities was significantly associated with their intention to remain in their role; **the better teachers felt about the quality of their school and classrooms, the more likely they were to want to stay at their school.** Some teachers reported experiencing adverse health impacts as a result of the poor conditions of their classrooms. These teachers were even more likely to consider leaving the school or teaching than the general pool.

A very important finding for educational leaders is that the quality of facilities was even more significant than the effect of dissatisfaction with pay for teachers deciding to leave or stay in the profession.



Teacher Efficacy and Engagement Linked to Facility Quality

In addition to impacts on the ways teachers feel about their roles and their intention to remain, the condition and cleanliness of school buildings affect how well teachers can do their job. School buildings in poor condition make it challenging for teachers to facilitate the type of learning experiences students need to be successful and actually cause illness-related absences for teachers and staff.

In a survey of urban educators, more than a quarter of respondents reported adverse health impacts related to the poor condition of their schools, most notably asthma and respiratory conditions. **These educators connected their health with poor indoor quality in their schools, dirty restrooms, and a lack of ventilation. For over 20% of educators who responded, these health conditions resulted in lost teaching time.**

Additional studies have shown connections directly linking the condition of school facilities with educator engagement and performance. Research on the relationship between school facilities and overall school climate found that the cleanliness and status of classrooms and school buildings positively impacted the attitudes and behaviors of teachers associated with successful outcomes–including stronger commitments to supporting students, engaging more deeply in the teaching process, and a willingness and desire to collaborate with colleagues. Research has noted that basic maintenance of a school building and the overall appearance influence overall engagement. A report from UCLA that reviewed research on the relationship between school facilities and teacher efficacy summarized the findings by clearly stating that schools with **poor conditions "do reduce the effectiveness of the teachers and subsequently have a negative influence upon the ability of the students to learn."**

The Impact of Cleaning and Maintenance on Building Life Cycles

Under the guise of 'saving money,' many school districts (and other organizations for that matter) practice what is known as 'breakdown maintenance'--a maintenance program in which nothing is done to a piece of equipment until it breaks down...While this may sound like a cost-saving approach to maintenance, precisely the opposite is true. Breakdown maintenance defers repairs and allows damage to accumulate, compounding an organization's problems. On the other hand, regularly scheduled...maintenance not only prevents sudden and unexpected equipment failure, but also reduces the overall life-cycle cost of the building."

The Dangers Of Substandard Facility Management Practices

Regular and proactive facility maintenance and cleaning improve building life cycles, and save school districts money over time.

From extending the life of expensive equipment, to optimizing facility utilization, to decreasing renovation costs, to lowering overhead costs such as utility bills, preventive measures help districts to make effective use of their school buildings and resources. This work is especially important with school budget purchasing power being increasingly constrained nationwide, a result of the end of Covid-era relief funding, increased fixed costs, and flat or decreasing enrollments. Unexpected repairs and infrastructure failures are devastating to school budgets, and a major obstacle to school leaders who are desperately working to raise teacher salaries, maintain core educational services, and provide effective learning support with limited funding.

At a minimum, schools and districts must have facility maintenance management practices that ensure the essential maintenance that is required as part of a system's design and cleaning–a type of preventive maintenance–happen on schedule. In a study that explored facilities maintenance in large public schools in Texas, researchers found that **many schools and districts have substandard facility maintenance management practices.** Schools that did have more detailed information about the condition of their facilities could better predict and manage maintenance needs. Because properly maintained systems and buildings run at a higher level of efficiency, consuming less utilities, these efforts can help districts save money and are more environmentally sustainable. Further, the regular inspection of systems increases the likelihood of detecting an issue before it becomes a significant failure. Unplanned failures typically result in expensive and untimely service calls.

Most notably, **facilities that are improperly maintained can be a health and safety hazard for students and teachers**, and the issues and related impacts often require costly and time-intensive efforts, often putting students and educators in less-than-ideal learning environments as mitigation or improvement efforts are underway.

With improperly maintained equipment and facilities, schools are more likely to experience system failures. These failures can result in short-term pauses to learning as custodial staff works to quickly address the issue. Or, they can result in more catastrophic disruptions, with thousands of students and educators without access to water or air conditioning, forcing a temporary school closure.

Modernizing Procedures is a National Priority with Local Action

And when the work requires an extended amount of time, school leaders often have to move around learning environments—either combining classrooms, utilizing hallways and other common spaces, and even setting up temporary, portable structures—all of which impede learning and growth.

Since school districts must run a balanced budget, these **unexpected repairs are paid for by either canceling or deferring previously budgeted items, or the district must draw down from fiscal reserves which may impact the district's overall credit rating or put it at risk of falling below the minimum established by state law.** Even worse, accumulated deferred maintenance can eventually lead to costly repair work that exceeds the price of replacement, resulting in the need to discontinue use of a particular facility and the corresponding high cost of new construction.

The risk of these catastrophic consequences can be minimized by taking the small, regular steps of effective cleaning and maintenance.

How Mature Are Your Current Cleaning Operations Processes?



<u>Download</u> Worksheets The U.S. Department of Education's recent creation of a Schools Infrastructure Division and funding of the "Supporting America's School Infrastructure" Grants underscore the critical importance of safe and healthy learning environments for students. These are in addition to the \$500 Million from the "Renew America's Schools" program under the U.S. Department of Energy which began releasing funds in 2022. Both of these programs flow resources to local districts through the state government. Clearly, improving and maintaining public school facilities is beginning to be regarded as one of the most important and foundational efforts needed to advance the learning, health, and wellbeing for all students. The availability of these funds, however, are dependent upon districts being able to articulate their specific needs and develop a response plan.

Utilizing technology to optimize this work will allow schools and districts to ensure an efficient use of resources to make the most out of shrinking budgets and limited janitorial staffing. In the 21st Century, integrated data systems and mobile facilities management technology are available to empower administrators and maintenance teams with tools and data to strategically plan maintenance work, track work order requests, coordinate with legacy systems, and improve cleaning quality–all with a focus on reducing costs and improving the experience of all who work and learn within classrooms, schools, and districts.

Modernizing Operations with Digital Tools and Real-Time Data

As school districts look to build better learning environments for students, teachers, parents and staff, school leaders are consistently moving toward digital tools to help in-room education and education operations with on average 42 distinct tools being used by students and teachers over an annual score year.



digital tools are used on average by students over the course of the school year.

When organizations look to their facilities, maintenance and cleaning operations, digital investment is often overlooked, however. And while students and teachers are aided in entering the digital revolution to be more efficient with their academic progress, front line operations team members are left with outdated methods.

While facing declining operational budgets along with larger deferred maintenance deficits, school district leaders are beginning to invest in technologies and tools to enable more efficiency across teams and functions. Digital innovation is being seen in many areas of operations for school districts. Mobile apps are helping field staff be more efficient while making it easier to capture accurate data on school activities.

Maintenance & Work Orders

Computerized Maintenance Management Systems (CMMS) have been a foundational tool for school operations leaders for awhile but newer technologies have arisen to make it easier to both submit requests and resolve work orders. Mobile applications are becoming crucial to improve performance, enhance productivity and driving return on investment.

Cleaning Operations

Custodial services is one of the most identifiable and impactful of school services provided by operations teams. Mobile technologies are being used by front line custodians to validate daily cleanings on their routes. This is tied to real-time analytics to understand cleaning performance across each school in the district on a daily basis.

Indoor Location as a Data Necessity

School facilities and cleaning operations is all predicated on ensuring teams cover every area of each school in the district. As such, it's integral that the systems used to execute on and measure daily strategies uses pinpoint location in its data model.

Innovations in using QR codes to hardcode exact locations to activities are becoming popular in operations technologies helping school districts provide transparency in the work being done every day.

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