

OpenBlue Indoor Air Quality



How to prevent indoor air quality from impacting learning in schools

Around one in twelve people in the United States suffers from asthma, while various allergies impact nearly one in six Americans. That means that, for tens of millions of educators and students, an average school day can be a frustrating and potentially even dangerously unhealthy experience. And for school boards and administrators, there can be a significant financial impact.

People with asthma spend thousands of dollars on their condition¹ each year on average, with the bulk of the expenses coming from doctors' office visits, hospitalizations and emergency care. Meanwhile, asthma is one of the leading causes of missed school time for children ages five to seventeen; in 2013, it accounted for an estimated 13.8 million missed school days.²

In the wake of school closures during the COVID-19 pandemic, our schools cannot afford to lose more learning. That's why addressing indoor air should be at the top of the agenda for schools, large and small, from elementary to university.

¹ www.atsjournals.org/doi/full/10.1513/AnnalsATS.201703-259OC

² www.cdc.gov/asthma/asthma_stats/missing_days.htm

What is indoor air quality?

Before 2020, most people paid little attention to the air inside buildings. That all changed during the COVID-19 pandemic when people became acutely aware of the reality – and danger – of airborne infection.

Since the start of the pandemic, many institutions, including educational facilities, have invested in improving their indoor air quality, or IAQ, to help curb the spread of the virus and to keep school employees and students healthy. But a focus on IAQ should not be limited to preventing the transmission of respiratory diseases.

“We’ve seen an encouraging increase in general IAQ awareness over the last two to three years,” says Tyler Smith, Vice President, Healthy Buildings at Johnson Controls. “But when it comes to understanding all of the benefits of improved IAQ, we’re still in the very early stages.”



We spend up to 90% of our time³ inside buildings

When most people think about the air inside a building, it’s often the temperature of the air that’s top of mind. Is it cold enough for a sweater? Is it too hot? IAQ doesn’t immediately come to mind because it’s not displayed on a typical thermostat nor felt directly. Yet, the quality of indoor air is important – it has a direct impact on how we feel, engage and learn.

“Nowadays we’re constructing educational buildings so they’re as airtight as possible to save energy and achieve sustainability goals. The consequences of a lack of fresh air are often neglected,” says Smith.

Inside all buildings, several factors influence IAQ:

- Volatile organic compounds (mostly human-made chemicals) can be given off by carpets, furniture and paint as well as from the use of cleaning products and hand sanitizers
- Inorganic gases (such as carbon monoxide) can be emitted from fuel-burning furnaces, water heaters and chemistry lab equipment
- Contaminants also come from our bodies in the form of exhaled CO₂ and viruses like COVID-19, measles and the seasonal flu
- IAQ is also significantly impacted by dust and other airborne particulate matter, such as pollen, industrial pollution, vehicle exhaust or even toxic smoke and fine ash from wildfires



Adding to the challenge, we have recently seen longer and worse allergy seasons⁴, with even more tree, grass and weed pollens making their way indoors through open windows and unfiltered vents, or on clothing and hair.

The humidity of a space is also a key component of healthy IAQ. When the humidity is too low, it can cause dry, itchy skin and eyes, rashes and dry out sinus membranes. When humidity is too high, it can worsen asthma and allergy symptoms and make it easier for dangerous bacteria and mold to grow. Areas like restrooms, kitchens and showers can generate significant moisture and are likely spots for high humidity related risk factors. With the ebb and flow of the school calendar, educational buildings are dynamic systems that change based on their occupancy and usage. That means IAQ is continuously shifting along with the weather, outdoor air quality, number of occupants, time of day and how building systems are performing.

³ www.epa.gov/indoor-air-quality-iaq/inside-story-guide-indoor-air-quality

⁴ www.aafa.org/extreme-allergies-and-climate-change

How poor IAQ affects physical and mental health

Indoor air contaminants can irritate anyone, with symptoms manifesting in the form of a cough, a headache or even poor concentration. But for asthma and allergy sufferers, the effects can be especially disruptive.

“We take about 20,000 breaths each day and spend 90 percent of our time indoors,” says Kenneth Mendez, CEO and president of the Asthma and Allergy Foundation of America (AAFA). “Reducing exposure to substances in the environment around us that trigger allergy and asthma symptoms is important. Eliminating these indoor triggers is a great place to start.”

According to a 2021 Lancet report, “in addition to decreased airborne infectious disease transmission, research shows that ventilation and air cleaning improvements are likely to lead to:

- Improved academic performance (particularly in reading and math)
- Fewer missed school days for students
- Higher scores on cognitive function tests
- And many benefits for teachers including decreased respiratory symptoms.”⁵



“Indoor air quality in schools can impact children’s health and how well they perform in school. Asthma is the number one reason children miss time from school, so staying healthy means more time learning. For parents and caregivers, staying healthy means less time spent missing work or using sick days to take care of family members,” says Mendez.

⁵ <https://static1.squarespace.com/static/5ef3652ab722df11fcb2ba5d/t/60a3d1251fcec67243e91119/1621348646314/Safe+Work+TF+Designing+infectious+disease+resilience+April+2021.pdf>

One solution: smart building technologies

During the pandemic many established companies and new entrants marketed solutions promising to improve IAQ. To truly be successful, schools must first thoroughly assess their air quality to determine where the problems may lie.

Then, they can more efficiently build a comprehensive long-term plan to measure, manage and improve IAQ, making their building healthier and improving the quality of health and life for occupants. Smart systems allow IAQ experts to review data and provide insights and recommendations on how to improve performance.

Schools – even older ones – can become a smart building with systems that monitor and improve IAQ to provide a healthier environment for occupants. A smart system dynamically adapts to changing conditions in buildings to maintain healthy IAQ. This capability is especially important during time

periods when allergy and asthma symptoms are more difficult to manage.

Mendez continues, “There’s something called “peak week” when hospitalizations and emergency room visits spike because of asthma attacks during the third week of September. This happens because kids return to school around this time. They are exposed to and spread respiratory illnesses in the classroom setting. Flu season is starting too. In addition, ragweed, the most common fall pollen allergy, peaks in September in the United States, and mold counts go up as leaves collect outside. These are all triggers for asthma.”

Improving IAQ in schools could be one way to help people control their asthma and allergies.

Everyone has the power to drive change and improve safety in the places we live, work and learn. School administrators, educators and parents can ask questions about how IAQ is managed in their school buildings and help ensure IAQ is part of planning and discussion, just as energy efficiency and carbon footprint are. If your school hasn’t taken steps to improve IAQ, it’s time to speak up.

To learn more about improving your IAQ, contact Johnson Controls. For details about asthma and allergies, get in touch with the Asthma and Allergy Foundation of America (AAFA).

Visit AAFA: www.aafa.org

Visit Johnson Controls: www.jci.com/openblue/iaq



About OpenBlue

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