Personal Safety

# Key Considerations for CO2 Monitoring in Educational Settings

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Preparations for going back to school are in full swing across the U.S. ***Over 76.3 million people*** – students, teachers, and staff – are hoping to resume their educational activities in a nurturing and safe environment.

But getting back to school goes beyond the simple reopening of buildings and campuses. It involves innovative solutions across multiple product categories to provide appropriate air quality monitoring, ventilation, and filtration, in addition to maintaining a comfortable temperature and humidity.

## The importance of good air quality in schools

All over the U.S., decision-makers are taking steps to make evidence-based, long-term improvements to indoor air quality (IAQ), reopen schools responsibly and safely, and keep them open.

Environmental Protection Agency (EPA) studies consistently show that indoor air pollution ranks among the ***top environmental risks to public health*** and indoor levels of pollutants may be two to five times higher than outdoor levels.

## Types of pollutants floating around indoors:

- $CO_2$
- Dust and dander
- Germs, viruses, and airborne microbes
- Mold and mildew
- Volatile Organic Compounds (VOCs)
- Asbestos

## Risks of poor-quality indoor air

The effect of poor IAQ in classrooms has been studied for years. ***A recent study*** by Harvard T.H. Chan School of Public Health shows that poor IAQ, coupled with high $CO_2$ levels and low ventilation rates, may dull cognitive abilities.

Indoor air pollution can have an influence on health as well[1]:

- Coughing, shortness of breath, or aggravating asthma
- Eye, nose, and throat irritation
- Headaches
- Allergic reactions

On the other hand, healthy learning environments[2]:

- Help reduce absenteeism
- Improve test scores
- Enhance student and staff performance

Understanding how important IAQ is for school performance and student and staff health, one of the key priorities is having strong, sustainable monitoring practices.

But when the goal is to focus on creating healthy learning environments through air quality, where do you start?

The ***EPA*** recommends the strategy for reopening schools should include a layered risk reduction approach to help limit the exposure to harmful substances. Good IAQ management must include[3]:

- Control of airborne pollutants
- Introduction and distribution of adequate outdoor air
- Maintenance of acceptable temperature and relative humidity

Here are five steps you should consider when thinking about the ways in which IAQ can be addressed for students, teachers, and staff:

### 1. Provide adequate ventilation

Healthy environments provide students with enjoyable learning experiences and opportunities to fulfill their potential. Proper ventilation of classrooms contributes to this goal of maintaining a healthy environment. Furthermore, it can be part of a COVID-19 prevention strategy for schools and childcare programs, according to the CDC[4]. Preventive best practices of any IAQ management program should include good ventilation, as this step can reduce the number of virus particles floating in the air and ***can prevent spreading diseases***.

The CDC recommends ventilation interventions ***to help reduce the concentration of virus particles in the air***.

To this end, $CO_2$ monitoring products are useful, as they can provide information on the quality of air inside a classroom or other enclosed spaces. This information can then be leveraged to assist with ventilation analysis and adjustments.

The ***EPA*** has put together a useful ventilation checklist for IQA for schools, which can be used by facilities and maintenance staff to examine outdoor air intakes and air supplies, system cleanliness, air distribution, exhaust systems and quantity of outdoor air.

### 2. Air quality monitoring

When it comes to air quality monitoring, it helps to have a constant check on the concentrations of $CO_2$ indoors. This can help when deciding to adjust the amount of outdoor air delivered and the CDC considers it a ***cost-effective approach to monitoring building ventilation*** when combined with HVAC systems that do not have modulating setpoints based on $CO_2$ concentrations.

The CDC[5] recommends ***using a portable $CO_2$ monitor*** and installing it near the breathing zones of occupied areas of each room, so as to collect data regarding air quality. Based on these measurements and occupancy levels, the intake of outdoor air can be adjusted, increasing the flow of air. A target benchmark for good ventilation $CO_2$ readings can be set below 800 parts per million (ppm). This approach requires periodic measurements of the $CO_2$ level, comparison with the benchmark, and adjustment decisions based on these and other relevant parameters.

### 3. Check for excess moisture

Air quality strategies should also include steps to prevent and mitigate the effects of excess moisture and dampness. If left unattended, moisture can lead to mold growth, which can, in turn, lead to allergic reactions, such as sneezing, runny nose, red eyes, and skin rash. The ***EPA*** recommends moisture be kept under strict control indoors. This can be achieved through constant monitoring, increased ventilation, and quick actions to prevent condensation.

Indoor humidity should be kept low, ideally below 60% relative humidity. It can be easily measured and monitored with a moisture or humidity meter[6].

### 4. Ensure thermal comfort

***A 2007 study*** is just one of the research papers showing the connection between the optimal classroom temperature and student performance.

The experiments carried out in school classrooms in late summer involved the manipulation of indoor air temperature, as well as the outdoor air supply rate. Students' performance in tests was significantly improved when the temperature was reduced from 25°C to 20°C (77°F to 68°F) and when the outdoor air supply rate was increased from 5.2 to 9.6 L/s (11.0 to 20.3 cfm) per person. These results are a good argument for temperature control in schools, especially in warm weather, as well as providing means of avoiding elevated temperatures.

### 5. Proper use of office equipment

The ***EPA's Administrative Staff Checklist and Backgrounder*** recommends checking the printing and duplicating equipment in schools. This can emit odors inside, so it should be checked and maintained regularly, and it should be in a well-ventilated area.

Other sources of possible contaminants, odors, and smoke, which can decrease IAQ, are restrooms, kitchens, and labs. The exhaust fans should be on and fully operating during school hours and the air should flow toward the exhaust intake, to ensure the complete elimination of any pollutants.

Data from monitoring of $CO_2$ in educational settings can be referenced when making IAQ adjustments that could be beneficial long-term for student health, thinking, and academic performance. A study by ***Harvard T.H. Chan School of Public Health*** shows that adverse effects have been reported for elevated $CO_2$ levels in classrooms, including increased student absence, increased asthmatic symptoms, nasal patency, and risk for viral infections. At the same time, higher ventilation rates and low $CO_2$ levels can positively affect cognitive function, and, by extension, academic performance[7].

Discover the ***entire range of $CO_2$ gas monitors from Honeywell***, a leading global provider of gas detection products ensuring exceptional protection at every level.

[1] *https://www.epa.gov/iaq-schools/why-indoor-air-quality-important-schools#why*

[2] *https://www.epa.gov/iaq-schools/why-indoor-air-quality-important-schools#why*

[3] *https://www.epa.gov/iaq-schools/why-indoor-air-quality-important-schools#why*

[4] *https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html*

[5] *https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html*

[6] *https://www.epa.gov/mold/brief-guide-mold-moisture-and-your-home*

[7] *https://schools.forhealth.org/wp-content/uploads/2020/02/Schools_ForHealth_UpdatedJan21.pdf*

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