

The Importance of Monitoring CO2 Levels in Classrooms – White Paper – SST Sensing Ltd

As new building air tightness standards have improved and refurbished buildings have less air leakage around doors and windows, infiltration ventilation rates within both new and refurbished education buildings have been reduced¹. It's ironic to think that before the demolition of the older and apparently "unfit" education buildings and places of work, have now been redesigned and constructed, in a way that some might say, have the "Sick Building Syndrome" [1]. These developments were to tackle the longstanding issues of draughty buildings. Ironically, ventilation was never thought as problematic before these improvements were made, as the wind circled around the buildings and the air was replaced on a regular basis.

New building air-tightness standards that reduce air leakage into buildings can lead to a build up of carbon dioxide in classrooms and can result in inadequate conditions for teaching and learning. The DfS Building Bulletin 101 states that;

"In teaching and learning spaces, in the absence of any major pollutants, carbon dioxide is taken to be the key indicator of ventilation performance for the control of indoor air quality" [2].

Distressing as it may be, few schools are sufficiently tackling this problem of indoor air quality (IAQ). John B. Lyons, author of Do School Facilities Really Impact a Child's Education declared that;

"We cram many more students into a classroom than we do adults in offices, and we expect them to learn huge amounts of information everyday....Adults working in these environments would probably sue their employer, but kids don't recognize the signs of bad indoor air quality and are really dependent on their teachers and school administrators to take action". [3]

The IEQ Review made an interesting point in their article "Sick Schools Can Mean Sick Kids" which stated;

"for years, studies have reported that poor indoor air quality can cause illnesses, forcing some kids to miss school". [3]

Data now proposes that deprived IAQ can shrink a person's ability to execute specific mental activities requiring concentration and memory.

Ventilation systems incorporating carbon dioxide monitors can be designed to provide optimum indoor air quality to keep the children alert through their lessons [1]. Many success stories are surfacing where researchers are finding clear associations between clean and healthy indoor air and improved student performance.

The DfES Building Bulletin 101– Ventilation of School Buildings [2], supports the Building Regulations Part F (7) in laying out the requirements for ventilation in schools. It states that;

"Ventilation should be supplied to limit the level of carbon dioxide in all teaching and learning environments so that...when it is measured at seated head height, during the continuous period between the start and finish of teaching on any day, the average concentration should not exceed 1500ppm." [2]

This is a boundary value and states that at any time, including when teaching, the pupils and teachers should have the freedom to lower the CO2 concentration to 1000ppm.

A study involving 800 students from eight different schools in Europe [5] [6], measured student performance related to indoor air quality. The data collated at the end of the study indicated that health symptoms and the students' ability to concentrate were related to CO₂ measurements in the classroom. The students were given a health symptom questionnaire on which to record data, and a computer-based program scored their ability to concentrate. The results showed that in classrooms where CO₂ levels were high students' scores were low and their health symptoms responses were high.

A study carried out by Professor Clements-Croome [5] came up with the same conclusions. He investigated the IAQ in 8 primary schools across Southern England and results showed a connection between the environment in classrooms and pupils' learning ability. The air quality conditions in the classrooms were found to be inadequate for teaching activities during about 35% of the school hours [5]. The CO₂ levels in the classrooms studied were 3.5 times the existing recommended concentrations of 1500ppm [5].

A hoard of studies carried out since 1984 upto recent years [4][5][6][7][8][9][10][11][12][13] have all reported similar findings that CO₂ measurements exceeded 1000ppm ventilation guidelines across Europe, America and Japan.

It was therefore necessary to test whether air quality monitors can make a difference. Mechanical ventilation systems were installed and the tests were statistically significant. They confirmed that, with IAQ management including source control and adequate ventilation, student performance can improve. In other words, CO₂ monitoring is a must for maintaining high levels of teaching and learning in the classroom. Apte and Angell [14] support that healthy indoor environments are a necessity if a high standard of education is to be expected. They argue that although peer-reviewed literature on this subject is sparse, there is a clear indication that classroom ventilation is typically inadequate.

SST's range of Air Quality Environmental Monitoring Systems were designed for the surveillance of air quality in any building. The AQ-Alert+ System measure the concentration of carbon dioxide in the air with options to also measure oxygen concentration, temperature, atmospheric pressure and relative humidity.

The frustration that surrounds the issue of poor indoor air quality often centers on the fact that the problem is invisible. Many either choose to ignore the problem and pretend it does not exist as they cannot see, feel or touch it, or they lack the knowledge on how to overcome the issue itself. All it takes is to read an article like this and these problems can quickly disappear with the help from SST's AQ-Alert+ product range or products of a similar kind.

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