

Irish Schools Air Quality Study

Summary Findings

Study Background

As part of a study into the benefits of monitoring indoor air quality, a pilot was conducted in three Schools from mid October 2020 to the end of term, and covered 9 weeks of classroom activity. Indoor air quality monitors recorded the CO₂, temperature and humidity levels every 30mins in the classrooms. Straight forward instructions were fed back to the class in real time via a wall mounted tablet device.

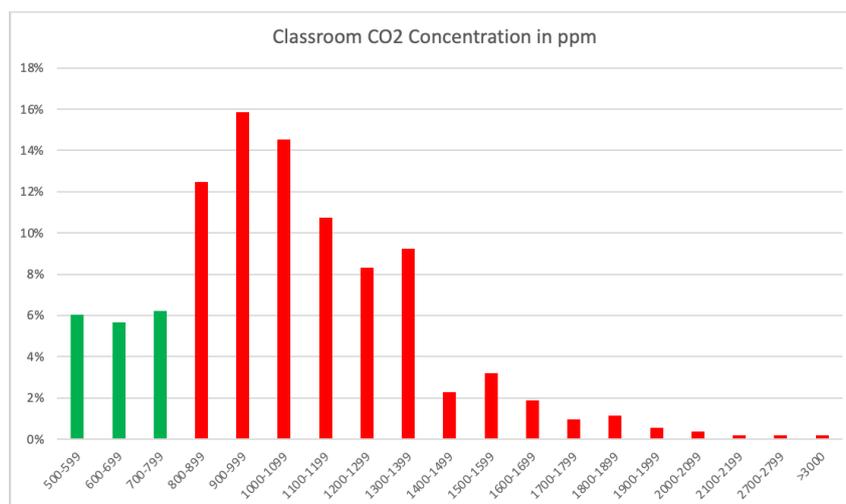
The wall-mounted display informs the teacher when to open or close the classroom windows:



Dangerously High Levels of CO₂

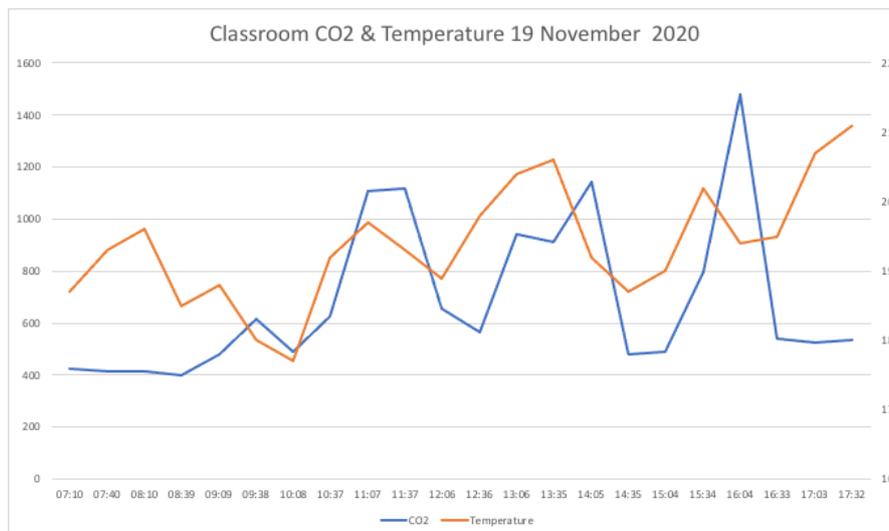
The most notable finding was that very high levels of CO₂ were regularly detected in the classroom environment. The HSE recommend an upper limit of 800ppm of CO₂¹. **During class hours** the following was found:

- The threshold of 800ppm was exceeded 82% of the time
- The average CO₂ levels was 1062ppm
- The maximum CO₂ level recorded was 3,803 ppm



¹<https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/buildingsandfacilitiesguidance/Guidance%20on%20non%20HCBuilding%20ventilation%20during%20COVID-19.pdf>

Manual Ventilation is Effective



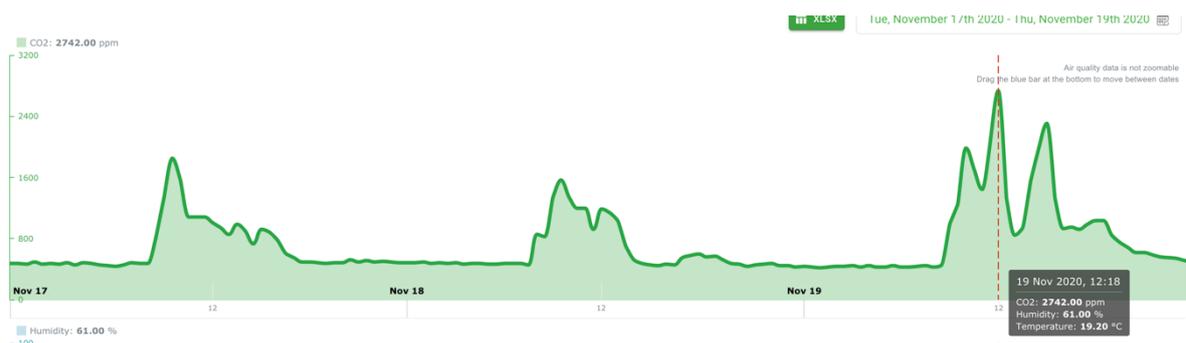
The above data was taken on a cold November day. It is very evident from the data that each time the CO2 levels rise up so does the air temperature as the windows were closed, then control action is taken by opening the windows to let in the cold fresh air. This pushes down both the CO2 levels and the classroom temperatures. The sawtooth effect is as a result of continuous changes to the ventilation by the occupants opening and closing windows.

These action were reasonably effective at controlling the CO2 levels. This shows that the teachers and pupils equipped with the right information took actions to control the indoor air quality, although they were not able to keep it below the 800ppm all the time.

Note also at the end of the day about 16:00 the CO2 drops back to less than 500ppm and temperature shoots up, because the rooms are unoccupied and the windows are shut.

Colder Weather Impact

It was very evident from the data gathered across the three schools that the arrival of cold weather reduced the teachers ability to control ventilation. Over the three days 17/18/19 November the ambient outdoor air temperatures dropped by over 10C. This resulted in increased indoor CO2 levels. This pattern was observed across all schools.



Marked difference in Different Classroom performance

Across the three schools we observed a marked difference in the ability of the occupants to control the indoor air quality. Over the course of the same three days, the three schools had different outcomes.

Maximum CO2	School 1	School 2	School 3
Mild day - 17 November	900ppm	1000ppm	1900ppm
Cold Day -19 November	1500ppm	1200ppm	2700ppm

- School 1 started from the lowest base 900ppm but once the outdoor temperatures decreased their levels went up to a maximum of 1500ppm.
- School 2 had the best overall performance containing CO2 to 1,200ppm
- School 3 started bad at 1,900 ppm and peaked at a dangerous 2,700ppm.