

Improving Indoor Air Quality in Schools: Establishing Good Indoor Air Quality as an Essential Component of a Healthy Learning Environment

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INTRODUCTION

We spend almost all our lives indoors – about 90 per cent ^(1,2). Unlike outdoor air, indoor air is continuously recycled; trapping and building up levels of pollutants ^(3,4). The COVID-19 pandemic highlighted the importance of Indoor Air Quality (IAQ) for good health and emphasised the role buildings and enclosed transport play in the transmission of disease ⁽⁵⁾.

In January 2020, a report and systematic review highlighted the effects of indoor pollution on children’s health. Over 80% of the evidence showed links between IAQ and children’s respiratory health with evidence of increased risk of eczema, dermatitis, greater hyperactivity, skin and eye irritations and difficulty sleeping ⁽⁶⁾. Students spend nearly one third of their typical day in the school environment, where they may be exposed to harmful air pollutants (or ‘harmful levels of IAQ’) ⁽⁷⁾.

Maintaining good IAQ is vital in schools, where it significantly impacts health, well-being, and learning. IAQ influences students’ ability to concentrate and thrive indoors ^(6,8,9). Poor IAQ with pollutants, allergens, and particulate matter leads to respiratory issues, including disease transmission, and reduced cognitive function ⁽⁵⁾. Insights gained from the COVID-19 pandemic further emphasise the importance of improving IAQ as part of infection prevention measures.

To improve levels of IAQ, schools in North Yorkshire were provided with portable CO₂ monitors from the Department for Education during the COVID-19 pandemic, with CO₂ being a useful proxy measure for IAQ. However, local issues were raised in terms of use in practice, understanding, and general awareness ⁽⁷⁾.

OBJECTIVES

- To improve use of CO₂ monitors in North Yorkshire educational settings following feedback that they ‘were shoved in a drawer’; providing support with interpretation of CO₂ readings, including understanding the limitations of using CO₂ monitors for measuring IAQ, whilst highlighting their importance in practice as a proxy measure
- To raise awareness of IAQ in Educational settings in North Yorkshire, providing practical advice, the benefits of improving IAQ on a range of outcomes including reducing disease transmission, improving concentration, improving other health-outcomes, and educational attainment
- To articulate the challenges and barriers in improving IAQ in educational settings alongside the trade-offs of maintaining thermal comfort amidst the cost-of-living crisis and a time of sustained financial pressures

METHODS

We undertook a series of training sessions with education leaders across North Yorkshire which included raising awareness, understanding immediate barriers, and developing an in-depth training resource with take-away produce to be used in settings. With support from North Yorkshire Council’s Health and Safety team we were able to understand more practical on-the-ground barriers and deliver hands-on interventions in settings via opportunistic routes as part of routine health and safety audits.

In addition, we focused on:

- Gathering feedback from schools and collaborating with health and safety teams, providing valuable insights to tailor local training resources.
- Delivering presentations to headteachers and school leaders via existing forums to raise awareness and encourage active measures.
- Developing a comprehensive toolkit of informative resources that enables implementation and in-classroom action including resources created by CoSchools Tools for Healthy Schools e.g. *figure 1* ⁽¹¹⁾
- Conducting informative webinars for primary and secondary schools, providing achievable IAQ improvement approaches.
- Listening to feedback on the barriers faced by settings, including balancing thermal comfort, and cost-of-living concerns, with adequate ventilation.
- Providing support to settings to answer local questions and signposting of other schemes for support including SAMHE, the Schools Air quality Monitoring for Health and Education study ⁽¹⁰⁾.

CO2 level guidelines

CO ₂ level	Description	Actions	Outcomes
> 1500 ppm.	Indicative of inadequate ventilation.	Keep checking ventilation provision (e.g. windows and doors are open) and the CO ₂ levels. If consistent, notify school leadership.	There are quite high levels of shared/rebreathed air in your classroom which, if maintained, might lead to poorer learning and health outcomes.
800 ppm to 1500 ppm.	Potential for stuffy/stale air and lethargic learners.	Open windows and/or doors – higher-level openings first and then lower-level openings.	Potential to improve ventilation in your classroom should be considered for better health and learning outcomes.
< 800 ppm.	Indicative of good ventilation.	If CO ₂ levels are not rising, and if the classroom is cold then you can consider slightly closing your window opening extents. Do so slowly and steadily.	Ventilation should be acting to help reduce the risk of airborne transmission but only as part of a fuller range of mitigation measures (https://www.gov.uk/government/collections/guidance-for-schools-coronavirus-covid-19).
Close to, or just above, 400 ppm.	Typical outdoor reading.	No actions required, but if your classroom is cold then the windows can be slightly closed.	Your classroom might be overventilated – this might not be of direct concern, but if your classroom is cold then you might be wasting energy and affect the learning experience.

Figure 1 Image taken from <https://www.coschools.org.uk/> March 2023

FINDINGS AND CONCLUSION

Engaging with schools on IAQ following the relaxation of COVID-19 restrictions with heightened awareness of the importance of environmental factors, and the relationship of trust with public health, was timely and well-received. During the initial training to school leaders in October 2022, there were high levels of engagement and recommendations around what was needed to overcome barriers seen on the ground.

However, in the final roll-out of training sessions in March 2023, engagement was lower than previous sessions. Despite the need for improved IAQ, and increased awareness, engagement and subsequent implementation is therefore low. Possible reasons for this are changing priorities for schools to get back to business as usual, practical or face to face delivery being more appropriate, and competing priorities with resourcing challenges.

To address these barriers, the focus has now moved to re-engaging with schools to understand barriers to implementation. This will include working with a smaller number of schools on a practical face-to-face basis to support implementation. We hope to further develop the relationship with Health and Safety colleagues on the ground to encourage seasonal monitoring of key locations to build a bigger picture of the situation in North Yorkshire.

We aim to better develop our understanding and articulation of the key motivational factors in educational settings, using a behavioural insights informed approach, to use IAQ as a tool for improving on the broad objectives within school settings, including educational attainment and attendance.

By identifying and addressing obstacles to bridge the gap between awareness and action and ensuring that schools prioritise and implement measures to improve IAQ, we aim to promote healthier and more productive learning environments, capitalising on the lessons learned from the COVID-19 pandemic on the importance of clean indoor air for all.

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- SAMHE Schools Air Quality Monitoring for Health and Education, (accessed 2023) <https://samhe.org.uk/about>
- Figure 1: CO-TRACE - CoSchools Tools for Healthy Schools (accessed 2023) <https://www.coschools.org.uk/>