Indoor Air Quality in European Schools

There are currently 95,000,000 pupils in Europe. As children spend around 70% of their time indoors, a good learning environment is crucial.

CO$_2$ concentration in classrooms

Although there have been improvements to school buildings in recent years, many classrooms still don’t provide an optimum indoor environment for learning.

Studies have reported that many schools have CO$_2$ levels above the recommended range of 1,000 to 2,000 ppm.

Recommended levels of CO$_2$

As classrooms are densely occupied spaces with a metabolic production of CO$_2$ by the occupants, the CO$_2$ concentration is directly dependent on the ventilation rate.

Recommended values lie between 1,000-2,000 ppm. While levels below 1,000 ppm are considered as hygienically unproblematic, levels above 2,000 ppm are hygienically unacceptable.

Improved indoor air quality = Improved performance

An average increase in performance by 2.8%, and even 15% in specific cases.

Increased speed
Higher levels of attention and concentration
Lower rates of absenteeism

Increase in performance = economic growth

An increase of school children’s performance by 2.8% would lead to a 6.7% - 9.5% increase in the conditional economic growth of the country (based on GDP per capita).

How to improve the indoor air quality in classrooms

As most schools in Europe have been designed for natural ventilation, more time should be set aside for airing during lessons.

Innovative natural ventilation solutions, e.g. demand-controlled natural ventilation, can maintain the CO$_2$ level within the recommended range.

Mechanical ventilation systems can ensure an optimum level of air quality without compromising thermal comfort in colder months.

Hybrid solutions can combine the advantages of both natural and mechanical ventilation.

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1 Eurostat: Education Statistics, Distribution of pupils/ Students by level (educ_ilev), extracted on: 21.06.2015.
3 Fraunhofer-Institut für Bauphysik IBP, Impact of the indoor environment on learning in schools in Europe, December 2015.

Infographic based on the following White Paper: Fraunhofer-Institut für Bauphysik IBP, Impact of the indoor environment on learning in schools in Europe, December 2015.