



## Results of the CO<sub>2</sub> Measurements and the Ventilation Intervals

### Ventilation intervals

As it could be proved that an increase in the CO<sub>2</sub> content on the air if a classroom leads to tiredness and fatigue, it was established that the goal must be an improvement of the air quality.

This should be done by means of simple ventilation.

**The „Pettenkofer“ limit** : even more than 150 years ago Dr. Pettenkofer recommended the limit for CO<sub>2</sub> in classrooms as proportion of gas in the air be no more than max. 1000 ppm.

**DIN 1946:** this DIN indicates that the CO<sub>2</sub> concentration at office workstations should not exceed a value of 1500 ppm.

**Compromised mental state** (i.e. tiredness, concentration loss and headache) will occur when a CO<sub>2</sub> level of 1000 ppm is exceeded. This has been proven.

Exceeding a CO<sub>2</sub> level of 1500 ppm can quickly result in **distortion of perception** (i.e. reduced processing of audio and visual stimulus).

### Intervals



In morning before the first class: 5min



20 minutes into every hour of tuition: 2- 3min



Middle of every 90 minute lesson or double hour lesson 5min



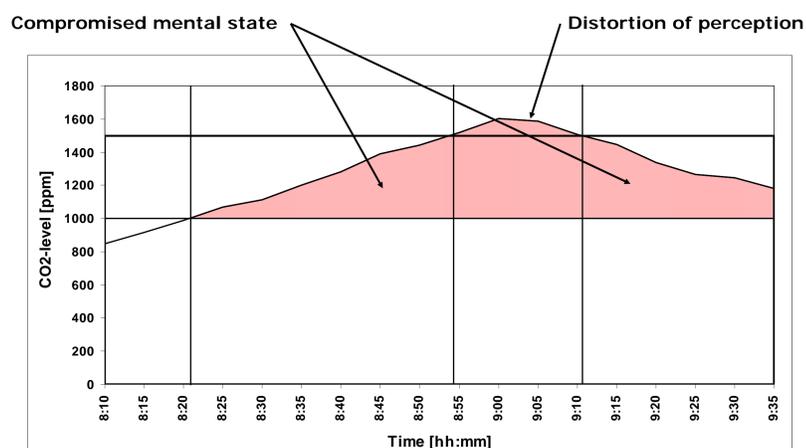
During every break: 5-10min

The ventilation intervals implemented for improving the air quality in the classroom environment consisted of the simple instruction to ventilate the classroom (blast ventilation) every 45min of tuition for approximately 2 minutes, and in addition in the middle of every second hour of tuition. Any other ventilation methods normally adopted should not be effected.

The following diagram (left) illustrating a typical double hour of tuition shows that without adequate ventilation it is only possible to work without being effected by excessive CO<sub>2</sub> for the first 20 minutes. After 45 minutes there is the danger of distortion of perception. Regular ventilation leads to a reduction in the CO<sub>2</sub> level, however without bringing the level down sufficiently in order to eliminate the possibility of effected mental state.

The reduction in the CO<sub>2</sub> level is easy to recognise following regular ventilation (right). The sustained effects of the actions are not to be overlooked. The probability of compromised mental state is greatly reduced. Distortion of perception due to high CO<sub>2</sub> levels in the air is no longer a consideration.

without ventilation break



with ventilation break

