Effects of intermittent air velocity on thermal and draught perception
– A field study in a school environment

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"Air velocity has significant effects on thermal comfort and air quality."

Figure 1. High velocity terminals installed in a class room.

Table 1. Intermittent velocity profiles at different room temperatures. H 5 and L 15 correspond to five minutes of high velocity followed by 15 minutes of low velocity, which will be repeated as long as the temperature remain unchanged.

Temperature [°C]	Velocity profile [min]
below 22	Constant low velocity
22-23	H 5 L 20
23-24	H 5 L 15
24-25	H 5 L 10
25-26	H 5 L 8
26-27	H 5 L 6
27-28	H 5 L 4
above 28	Constant high velocity

Air movements in an indoor space may be experienced in very different ways. For persons feeling cool, air movements tend to be perceived as draught, whilst feeling warm air movements may provide a desired cooling effect. In the transition zone it therefore seems difficult to use constant air velocity as a tool for cooling without creating draught.

One possible way is to use intermittent air velocity instead of constant velocity. Intermittent air velocity, or velocity variations (**Table 1**), consists of high velocity pulses, strong enough to offer occupants the desired cooling effect but with a limited duration, in order to avoid draught. This new method was implemented in a high school in Sweden. One classroom where equipped with a ventilation system which could produce velocity variations in the occupied zone. This was realized by letting the supply air enter the room either through high velocity terminals (**Figure 1**) placed in four rows straight above the occupants, or through standard low velocity diffusers. During the high velocity period the ventilation system produced a downward air jet with a mean speed of 0.4 m/s, measured straight below the terminals at head level of a sitting person. The intermittent velocity changes or velocity profile, periods of high respectively low velocity (**Table 1**), were controlled by the room temperature. Two classrooms, which were placed beside each other and considered as having approximately identical climate conditions beside the velocity, were used to collect data. Evaluation was done during spring (April) and autumn (September).

The analysis did show significant effects of velocity condition on thermal comfort and air quality. People exposed to velocity variation perceived the air as cooler and fresher compared with those exposed to constant low velocity and very few classified the air movement as draught. A further conclusion is that even the pupils who were exposed to velocity variation wanted slightly more air movements. ■

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