



The effect of indoor air quality in Dutch higher education classrooms on students health and performance

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Abstract

Teachers and students need good learning environments to perform well. In this study it is pre-supposed that the spatial properties of classrooms can contribute to the quality of the educational process. Thermal, acoustic and visual conditions and indoor air quality (IAQ) may be extremely powerful in order to support the in-class tasks of teachers and students. But what are the optimal conditions? And do schools provide optimal indoor environmental conditions?

Research shows that adequate ventilation and thermal comfort in classrooms could improve academic performance of students. However, different studies also suggest that poor indoor environmental quality in classrooms are common and, in some cases, even unhealthy.

This study investigates the relationship between indoor air quality (IAQ), perceived indoor air quality (PIAQ) and building-related symptoms of students in university classrooms via subjective assessment and objective measurement. This study was carried out in 59 classrooms of a university of applied sciences in the northern part of the Netherlands during heating season. Responses from 366 students were obtained through a questionnaire.

Results shows that carbon dioxide concentrations (CO₂) exceed minimum Dutch guidelines in 36% of the observed classrooms. Moreover, after a 40 minute class this raised to 45% of the observed classes. Poor IAQ can affect teachers and students level of attention, cause arousal and increase the prevalence of building-related symptoms. A significant correlation was found between CO₂ concentrations and PIAQ and between PIAQ and the ability to concentrate, tiredness and dry skin.

The research findings imply that increased CO₂ concentrations will affect the PIAQ of students and may cause inability to concentrate, increased tiredness and dry skin. These building-related symptoms can cause distraction and affect the academic performance of students negatively. It is highly recommended to improve IAQ in classrooms by offering better indoor environmental conditions through reducing CO₂ concentrations.

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