Subjective and objective assessment of acoustical and overall environmental quality in secondary school classrooms

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Short title: Assessment of acoustical quality in classrooms

ABSTRACT

A subjective survey on perceived environmental quality and acoustical measurements have been performed on fifty-one high-school classrooms, of which some have been acoustically renovated. A questionnaire, submitted to 1006 students, included items on overall quality and its single aspects such as acoustical, thermal, indoor air and visual quality. Acoustical and visual quality had the highest influence on learning capacity and profit and, in parity to the dissatisfaction with other aspects, they play a more important role in the overall quality assessment. Acoustical quality was correlated to speech comprehension, while speech comprehension was correlated to the Speech Transmission Index ($STI$), even though $STI$ does not reflect all the aspects speech comprehension can be influenced by, for example the instructor’s characteristics and the course material as well as the way of teaching. Other results were the good correlations between the minimum vocal efforts measured in the classrooms and the $L_{nA90}$ background noise levels, and between the noise disturbance scores and the maximum A-weighted sound pressure levels, which were confirmed by the finding that the main sources of noise disturbance, beyond students talking within the classrooms, were non stationary sources. The most important consequence of poor acoustics was that of reduced concentration.

PACS Number: 43.55Hy, 43.71Gv, 43.55Gx, 43.50Qp, 43.72Dv