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WHAT IS A GOOD ENVIRONMENT IN CLASSROOMS?

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In Sweden and probably also in the UK, there is much concern regarding classroom environments. Most Swedish schools were built in the 1960s and 1970s or earlier and at that time environmental issues were not so important, however, many of these schools will need to be refurbished in the near future.

Our mission is to create an environment which supports maximum efficiency to the learning process, taking into consideration a range of climatic factors such as heating, ventilation, lighting and of course, noise. To achieve a good environment you must keep each climatic factor to an acceptable level, you cannot compensate one with another.

To control the noise factor we introduce the concept of ACOUSTIC COMFORT. Classrooms can be divided into "speaker's" (teacher's) comfort and "listener's" (student's) comfort, with the communication link between.

The ideal condition is when the speaker knows how to deliver a message and gives time for the listener to consider it. However, in most cases there are disturbances somewhere in the link from speaker to listener, this could be a bad speaker, environmental disturbances or an inattentive listener.

We know good acoustic comfort for a listener is equal to good speech intelligibility, which is defined as follows:

RASTI value ≥ 0.75
Background noise level ≤ 30dB(A) and ≤ 50dB(C)
Short reverberation time ≤ 0.6 seconds (125-4000 Hz)
No disturbing noise reflection

CLASSROOM ENVIRONMENT

This can create a dilemma because usually it is the speaker who is judging the listener's comfort. This often results in a too long reverberation time because the teacher is uncertain whether the message has reached the listener. Our advice to the teacher is to take a seat in the back row and listen, he will then understand that the ideal condition for the speaker is when the listener can concentrate on the message. This means acoustic comfort for the listener is equal to acoustic comfort for the speaker and the message is, in fact, reaching the listener.

A practical solution for a classroom means the ceiling can be divided into three zones. Zone 1 is along it's perimeter where you want to avoid reflected sound. Zone 2 is the main part of the ceiling which is used to reduce the reverberation time. Zone 3 is the part of the ceiling above the speaker and in large rooms may need to be more reflective. Some examples will be shown with different sizes of classrooms.

Ecophon's continuing research programme is run in conjunction with the Lund Institute of Technology and will result in a great deal of new data in the near future.