

CLASSROOM ACOUSTICS - RECENT EXPERIENCES

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1. INTRODUCTION

Major parts of renovated or new school buildings in Norway the last 5 to 6 years are built with open plan or base solutions (large classrooms). The main reason for this has been a new educational strategy. Open plan solutions were also popular about 30 years ago in Norway. Such solutions have not been evaluated with respect to acoustical properties. From our point of view, the new concept has been established without considering issues related to physical environment. SINTEF Building and Infrastructure has carried out several projects and evaluated other research work on this item. This paper presents some of the most important results and recommendations so far. Key issues of the content are presented in the following.

2. NOISE LEVELS

A well known fact is that the learning decreases with increased noise levels. Noise from activities in the room, technical installations, neighbouring rooms and outdoor activities are important for the noise level. A number of requirements according to noise levels exist, but even at new schools there is unfortunately a lack of fulfilment of these requirements. It is also very important to reduce activity noise, for instance physically separate traffic areas and educational areas.

3. PRESENT RECOMMENDATIONS

In the Norwegian Standard NS 8175, maximum limits are given concerning reverberation time for different types of rooms for education. We use the definition of classroom size in table 1 related to the description in NS 8175.

Table 1. Classroom size

NS 8175 type of room	Suggested size [m ²]
Standard classrooms	< 80
Base and open plan solutions	80 – 200
Large teaching areas or auditorium	> 200

Based on experiences so far we can say that traditional classrooms, group rooms or auditoriums are suitable for oral presentations. Base solutions can partly be suitable for presentations while open plan solutions and large education areas are generally not suited for oral presentations. Recommended sound absorption in the room increases with the room area, but then the possibilities of oral presentations of course decrease. Beside reverberation time, we recommend certain limits concerning Speech Transmission Index and distance dependent damping for large teaching areas. For details and comments, see reference [1].

4. RESULTS

Recently, studies have been carried out on a number of schools with base solutions. It includes general investigations of the indoor environment, investigation of subjective perception and measurements of noise levels and reverberation time. The paper will present numerical results compared with both requirement and evaluation of subjective perception.

5. REFERENCES

- [1] SINTEF Building and Infrastructure. *Acoustical planning of school and kindergartens*. Building Detail sheet no. 527.305, 2006 (in Norwegian).