

American Academy of Audiology
Position Statement

Classroom Acoustics

August 2011

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The American Academy of Audiology supports the improvement of acoustical properties of America's classrooms in order that all students may better hear their teachers (direct instruction) and peers (indirect instruction). In order to address the issue of improving classroom acoustics, the classroom acoustics standard of the American National Standards Institute (ANSI S12.60-2002, Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools) was approved in 2002. ANSI S12.60 recommended maximum noise and reverberation times for all new and significantly renovated school construction. The standard specified that noise levels in core learning spaces should not exceed 35 dBA throughout each classroom (unoccupied). The 35 dBA maximum noise level ensured that the level of direct instruction (which would be approximately 50-65 dBA depending on the location of the student and teacher) would achieve the appropriate sound level required by students to hear their teachers and peers with minimal difficulty, and with reduced vocal strain from the individual speaking. The standard also specified that reverberation times not exceed 0.6 seconds (unoccupied). This would improve speech intelligibility for students by maintaining the temporal integrity of the source signal.

S12.60-2002 was revised, and is now ANSI S12.60-2010, Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 1: Permanent Schools. The core parameters of the standard were unchanged with the exception of a requirement that primary learning spaces be readily adaptable to reverberation times as short as 0.3 seconds. In addition, a second set of guidelines, ANSI S12.60-2009, Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 2: Relocatable Classroom Factors was published. This document addresses some of the unique challenges posed by modular classrooms that have become prevalent in the US in recent years. Both standards maintain, at their core, an emphasis on ensuring appropriate signal-to-noise ratios, in all learning spaces, to ensure both audibility and intelligibility of direct and indirect instruction for all students. ANSI/ASA provides the standards at no charge in order to promote improved listening environments for all students (<http://asastore.aip.org>).

The American Academy of Audiology endorses both the ANSI S12.60-2010, Part 1 standard, and the ANSI S12.60-2009, Part 2 standard, and recommends adoption of these standards by all schools, school boards, and school districts for the following reasons:

1. All students require an appropriate acoustical environment in order to learn effectively.
2. Younger students are especially vulnerable to poor acoustics because of their immature central auditory nervous systems.
3. Students with hearing loss are especially in need of appropriate acoustical environments.
4. Bilingual students and students with other communicative challenges require an optimal acoustical environment to maximize learning.
5. Quiet rooms are better for learning than loud classrooms with amplification, particularly for receiving indirect instruction from peers.
6. The cost of quiet classrooms is more than balanced by improving the ability of students to hear and therefore to learn.
7. Classrooms that meet the acoustic criteria specified in the above standards will greatly assist students in their ability to hear their teachers and peers with reduced voice fatigue for the individual speaking.

In order to minimize background noise levels, classrooms require quiet HVAC systems, acoustically adequate doors, windows, floors, ceilings, and walls that are selected and installed properly so that they isolate one room from another and from outside sounds. Proper selection and placement of acoustically absorptive materials are required to reduce the negative effects of reverberation on intelligibility.

Audiologists should become familiar with the standard, and should learn about methods for measuring noise levels and reverberation time, identifying sources of noise in classrooms, and making recommendations for remediation.

The American Academy of Audiology is committed to improving the listening environment for all students. This Task Force will continue to provide additional evidence-based “best practice” recommendations regarding related issues in the future.