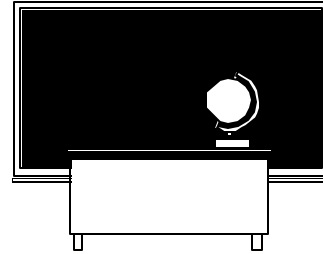


LISTENING FOR LEARNING 2:



WILL OUR NEW CLASSROOMS MEET THE STANDARD?

When your school system is planning a new school, ask to brief the building committee on the importance of good classroom acoustics. Share resource materials and research findings and show the short video developed by the Access Board. Demonstrate that achieving good acoustics is most cost-effective in new construction (see *Listening for Learning 3: Counting the Costs of Noisy vs Quiet Classrooms*). Obtain copies of the ANSI/ASA S12.60-2002 standard on classroom acoustics and recommend its 'design-to' approach to limiting background noise and reverberation (no sound meters required!). Ask to have the standard included as part of the bidding and construction documents for the project.

When the architectural firm is selected, ask to meet with them to discuss acoustical design issues and practices. Here are some key questions:

- Are classrooms located away from noisy outdoor spaces (highways, bus loading areas, playgrounds...)?***
- Are classrooms located away from noisy school spaces (gym, band room, cafeteria...)?***
- What are the STC ratings of the walls (including their openings) that separate classrooms from each other and from corridors and the exterior?***
- Will the specified ceiling tile have an absorbency rating high enough to control reverberation?***
- Is there a central heating, ventilating, and air conditioning (HVAC) system that locates noisy fans and compressors away from classrooms and delivers air at low velocities?***

Don't forget to bring a copy of the new standard. ANSI/ASA S12.60-2002 includes a great deal of advisory information for architects and educational facility designers who are not yet expert in acoustical design practices. Firms who contract with an acoustical engineer for more specialized auditorium and gymnasium design may wish to add consultation on classroom design to the project to develop their own skills.

Open-plan Schools. Noise in open-plan classrooms cannot be controlled to meet the 35 dB(A) background noise limits specified in ANSI/ASA S12.60-2002. Schools of this model are not suitable for young children, and are particularly poor learning environments for youngsters who have additional risk factors such as English as a second language, learning and speech disabilities, and hearing loss.

Can't technology help? Americans have a lot of faith in technology and many existing schools with poor acoustics have tried soundfield systems -- a microphone for the teacher and small loudspeakers for the kids -- as a remedy. Unfortunately, as volume increases, intelligibility declines. For some children with auditory disabilities, amplification makes listening more difficult, even painful. New schools should not rely on amplification that adds volume at the cost of speech clarity (and requires higher STC values in interior walls to keep noise from adjacent rooms).

Signal-to-noise Ratio (SNR). Speech intelligibility is largely a function of the signal-to-noise ratio (SNR), which measures the difference between the desired sound signal (for example, the teacher's voice, typically about 50 dB(A) at the back of a classroom) and the unwanted background noise. The lower the background noise, the higher the SNR can be and the greater the gain in speech comprehension. For young children just learning language and reading skills, SNRs must be at least +15 dB for good understanding. Young children who also have a temporary or permanent hearing loss may need a higher SNR. When background noise is limited to 35 dB(A), it's possible to achieve high SNR values without excessive volume.

Cost/benefit Analysis. Teachers report that quiet classrooms are easier to teach in, are 'self-enforcing' for noise, encourage respectful behavior, and help children be calmer and more attentive. Kids in quiet classrooms are more successful because their energy can be focused on learning rather than listening. By investing a small amount more in new school construction budgets, school systems can realize substantial program savings in special services, repeats in grade, and teacher stress.

The Language of Acoustics. To be an effective advocate with decisionmakers and design professionals, you'll need to understand acoustics issues and terminology yourself and feel confident you can marshal research findings in support of your recommendations. The ASA publications *Classroom Acoustics I: A Resource for Creating Learning Environments with Desirable Listening Conditions* and *Classroom Acoustics II: Acoustical Barriers to Learning* are good places to start. The first provides a technical overview of classroom acoustics issues, including guidance on achieving acceptable conditions, while the second provides rationale and the research behind it.

For more information... The ANSI/ASA S12.60-2002 standard for classroom acoustics was developed by the Acoustical Society of America (ASA) in collaboration with the U.S. Access Board and other stakeholders. Information on ordering the standard and other materials on classroom acoustics, including a videotape, design manuals, and a bibliography, are available on the Board's website at <http://www.access-board.gov/publications/acoustic-factsheet.htm>. The Board also maintains a toll-free technical assistance line at 1/800/872-2253 (v); 1/800/993-2822 (tty).