

A Sound Education

Don't let acoustic problems rule your school

By Janelle Penny
February 2011

Poor acoustics can lead to learning setbacks, especially for a child with hearing impairments or learning disabilities. A school's needs vary as widely as its classroom designs – the ability to hear well with minimal reverberation is paramount in a standard classroom, but in a library or media center, the same speech intelligibility could distract students from reading or studying. Consider three main acoustical concerns as you design or renovate each space:

Background noise: This should be as low as possible in a traditional classroom to keep the instructor from having to speak louder in order to be heard over the noise. Background noise that's too loud can lead to vocal strain for the teacher, and students may fall behind academically if they can't hear, says Alicia Wagner, a consultant for Acen-tech.



Reverberation time: This value should fall between 0.5 to 0.8 seconds, and the room should be adaptable to provide an even shorter reverberation time if a hearing impaired child joins the class. "You don't want the instructor to feel like they're talking into a sock," Wagner says. "At the same time, you don't want a lot of reflections that will just keep the sound within the space and interfere with speech intelligibility."

Sound isolation: Sounds leaking into the classroom from nearby spaces are an obvious distraction. Doors are frequently the culprit here, especially because schools are likely to favor lighter doors which are easier for children to use, instead of heavy acoustical doors that block sound.

Diagnosing the Problem

If students or staff members are complaining, it's time to do something about your acoustical problem. Hiring a trained consultant is the easiest, most effective way to get to the root of the issue, Wagner says.

"People will say 'We have an acoustics problem, can you recommend some panels we can put up?'" Wagner adds. "A lot of times panels aren't the solution – the solution is you have to fix that fan coil unit, or you need to change this door."

The most common sources of acoustical dissatisfaction in schools include people in neighboring rooms and hallways, noise generated by copiers, computers, and other equipment, HVAC sounds, outdoor noises, and excessive echoing, according to a study on school comfort conducted last year by University of California, Berkeley, graduate student Lindsay Baker.

The National Council of Acoustical Consultants, a professional organization for the acoustical industry, offers a searchable database of consulting firms. Some may be certified by the Institute of Noise Control Engineering, which offers an optional credential for consultants.

Once you've chosen your consultants, they'll measure your space's reverberation time, sound isolation, and background noise level, and look for penetrations that aren't sealed well and other paths that transmit sound between classrooms.

"Many times with schools, they have noisy cafeterias, gyms, or classrooms," says Dan Heston, a sales engineer at Unger Technologies. "Typically, these problems stem from reverberation or poor acoustics. They have a lot of hard surfaces in some of these areas, so they have a lot of noise that bounces around from kids, which garbles speech."

Searching for Solutions

It's easiest to address acoustics during construction, but for existing buildings, this isn't an option. Upgrading the gaskets on doors that connect classrooms, or simply replacing the doors altogether, can go a long way toward keeping noise from leaking into neighboring rooms.

Extra background noise may also be caused by noisy equipment. If an air handling unit or chiller is brand-new or hasn't been cleaned or serviced lately, it could be noisier than necessary and may create extra community noise.

Unit ventilators, an individual air handling and heating system for each room, and exposed ductwork create noise that's distracting for teachers and students alike, especially students seated next to the ventilators.

"Noise leads to lack of focus on the teacher and a poor learning environment," Heston says. "If everything's not quiet, you either get noise coming from other classrooms or you can't hear the teacher speak. It'd be hard to learn in that type of environment."