Acoustics in Schools is intended to be a tool for architects, interior designers and other design professionals who work to improve school environments. Commissioned by Ceiling and Interior Systems Construction Association (CISCA) and prepared by the InformeDesign Research Desk at the University of Minnesota, the white paper is an introduction to the acoustical issues commonly confronted on school projects. Practical design responses to these issues are then presented in practitioner-friendly language. The following is an abridged version of the white paper. To view the entire paper, including a glossary of terms and a listing of references, visit www.cisca.org.
The importance of environments that support clear communication.

Students with learning, attention, or reading deficits are more adversely affected by poor acoustic conditions than the average student. Teachers benefit because teachers speaking in loud or reverberant classrooms can have less intelligibility, and students have a harder time listening to the teacher. Students feel better acoustic conditions to hear the teacher.

Acoustical design considerations for general classrooms

Spend intelligibility decreases with increased noise levels and reverberation times, and may occur in classrooms.

To improve the acoustic environment of schools, designers need to focus on controlling background noise, reverberation times, and signal-to-noise ratios.

Classrooms typically have speech intelligibility ratings of 75%, meaning every fourth spoken word is not understood.

Reducing external background noise

To help the teacher of students of hearing impaired environment, consider these measures:

WALL AND CEILING CONSTRUCTION

Major sources of background noise include noise from outside the classroom (doors, windows, HVAC systems, etc.), and inside the classroom (HVAC system, plumbing, air conditioners, heating ducts, etc.) away from critical listening areas. Place the source of sound as far away from critical listening areas as possible. Encourage the teacher to face the source of noise while sitting in the room. Excessive reverberation can cause echoes that interfere with speech intelligibility. Minimize reverberation to improve speech intelligibility.

Introducing reverberation

Noises from outside the building (street traffic), outside the classroom (hallways, adjacent rooms, HVAC systems, etc.) affect classroom acoustics. Reduce background noise.

To increase the amount of soft, rough, or porous sound-absorbing surfaces in room to reduce the reverberation of external noises into classrooms.

Reducing reverberation

To help the teacher of students of hearing impaired environment, consider these measures:

REDUCING NOISE FROM ADJACENT SPACES

Improving signal-to-noise ratio

Consider the use of hearing assistance technologies such as personal frequencies hearing aids, direct sound pickup transmitters, or induction loop, infrared voice transmitters to help children with hearing loss to better hear the classroom teacher.

To improve the acoustical performance of general education classrooms, follow these design strategies to enhance the learning environment of spaces that have unique acoustical requirements.

Meeting ASH812.62-2002

The second concern is what is being done to lower background noise levels in classrooms.

Additional acoustical design considerations

In addition to the measures suggested for general classrooms, consider these design strategies for specific types of spaces that have unique acoustical requirements.

Meeting LEED® for schools 2009

The second concern is what is being done to lower background noise levels in classrooms.