Classroom Acoustics:

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lems are caused by deficiencies in the design of the school facility itself.

Background noise competes with important speech signals. Poorly designed heating, ventilation and air-conditioning (HVAC) systems and noisy equipment choices are often a source of background noise. External noise that penetrates into the classroom from outside locations can be another problem area.

Reverberation is caused by sound that reflects off hard floors, walls, and ceilings in the classroom. We usually want spoken language to reflect to help carry it out to everyone in the classroom, but when the speech signal continues to bounce around the room you have an excess level of reverberation. Excess reverberation causes the speech sounds to overlap, so that speech becomes smeared and difficult to understand.

Both speech levels and background noise levels are measured on a decibel (dB) scale. A simple comparison between the two is called the signal-to-noise ratio (S/N). The S/N describes the difficulty in hearing one's own voice clearly.

setting. In early elementary school, many students are not sufficiently mature to handle the mic properly. A mic can generally work well with students who come to the front of the room to make presentations. The more typical interactions of short questions, answers, and comments don't lend themselves well to the time delays in passing a mic around a classroom of 25 and more students. Even well-intentioned teachers sometimes fail to repeat the comments of students, and they will often times edit and re-phrase the comments for general class consumption without the grammar mistakes, idioms and "cool" expressions of the kids.

If you ask young oral adults to share their experiences, they will many times be willing to tell you about missing out on the language of their peers in school. In our community, a child psychologist also shared with us that a simple indicator of the successful socialization of local pre-teen girls can be found in the expressions and mannerisms in how the girls talk. These girls are certainly going to have to be able hear their peers well enough physically and mental stress from bombardment by background noise in the classroom. We haven't yet found research evidence specific to this issue of the stress on children who are using hearing aids and cochlear implants, and it hasn't so far become a major issue for Nicole. If you've ever listened to fan noise through a hearing aid using a testing stethoscope, it will give you cause to think about this noise stress issue.

Even when using an FM system, most hearing aids and cochlear implants are still receiving a good portion of the signal from the environment.

by Joseph Smaldino, PhD, CCC-A

4) National Clearinghouse for Educational Facilities Research List: Classroom Acoustics

One Person Can Make a Difference: Get Involved

One mom, acting alone, started the classroom acoustics ball rolling in 1997 with a petition to the United States Access Board. Widget Richards' efforts ultimately led to the development of ANSI/ASA S12.60-2002.

Some families have now been successful in advocacy efforts at the state and local level in getting acoustics standards included into code, ordinances or regulations. The Access Board's webpage shares information on those local successes.

Other families have encountered school district administrations that are not yet supportive of the listening needs of our children. Lack of legal precedent in both IDEA and Section 504 law leave families with challenging situations. In our own case, Nicole's straight A's along with her self-confidence and good self-esteem just don't give us the obvious guidance of how that is

Professor Robert E. Apfel, Visiting Professor of Architecture at Yale University. His testimony was provided in response to the Access Board's 1998 Request for Information on the subject of classroom acoustics. He so eloquently expresses the ultimate "why" and "how come": "Moreover, when bad acoustics are a primary reason for prohibiting students with disabilities the opportunity to benefit from education or it increases the cost of education, the students and we are all poorer."

Resources: