Influence of Classroom Acoustics on Learning.

Studies have shown that school-age children spend up to 75% of their day performing “listening processes”. Listening is dependent on receiving a clear, undistorted message. With such a high demand on students’ listening skills, the acoustic qualities of the classroom are of utmost importance. The intent of this article is to highlight the importance of creating a good listening environment for our students and to discuss the negative effects that noise in the classroom can have on learning.

The average noise levels in most classrooms can range between 66 decibels (dB) and 94dB, (Rosenberg, 2010; Picard and Boudreau, 1999). One study found that average classroom noise levels were 72dB which is comparable to standing next to a busy intersection (Shield, 2001).

We know that younger children have immature central auditory nervous systems which make them particularly vulnerable to the effects of poor classroom acoustics. Bilingual children are at an even higher risk for facing challenges imposed by poor classroom acoustics. Students with disabilities such as visual impairment or hearing loss may still suffer the consequences of poor classroom acoustics, even with an Individualized Education Plan (IEP) in place.

**THERE ARE THREE FACTORS THAT CONTRIBUTE TO THE ACOUSTICS OF A PARTICULAR CLASSROOM. THESE ARE THE LEVEL OF NOISE, THE LOUDNESS OF THE SPEAKER’S VOICE OR “PREFERRED SIGNAL”, AND THE AMOUNT OF REVERBERATION PRESENT OR “REVERBERATION TIME”.

The ratio of the preferred signal to environmental noise is often referred to as the Signal to Noise Ratio or SNR. According to ANSI Standards for classroom acoustics, noise levels for an unoccupied room should not exceed 35dB. The teacher’s voice is expected to range somewhere between 50-65dB, making the preferred SNR +15dB to +30dB. Studies completed by Picard and Bradley, 2001, found that a -6dB SNR was typical for most classroom settings. Reverberation time is the time it takes for noise to reach half of its original loudness and should not exceed 0.3 seconds, according to ANSI Standards. Longer reverberation time will lead to distortion of the teacher’s voice and can impair the listener’s ability to understand what is being said. The combination of poor SNR and increased reverberation time can not only impair speech intelligibility but can also cause a child to become distracted more quickly.

A survey of primary school teachers revealed that most did not have adequate knowledge of classroom acoustics or the effects of poor acoustics on speech perception and learning. Most said that their education provided little information regarding classroom acoustics and how to manipulate or control the acoustics of their classroom.

While most newly constructed schools are upheld to ANSI Standards for Acoustical Performance, schools that were built more than ten years ago may not have been built up to these standards. Luckily, minor adjustments made to the classroom can have a dramatic effect on students’ performance. Acoustic tiles, fabric panels (such as drapes or curtains), or artwork hung on walls can help absorb noise and decrease reverberation time. Area rugs or carpet tiles work in a similar fashion but when placed under desks can also cut down on noise created by moving chairs and footsteps. Desks should be arranged away from noise sources. Noise sources may include heating/cooling systems, projectors, computers, space heaters and circulatory fans. Windows and doors that connect to hallways or restrooms can introduce noise into the classroom and can pose as a visual distraction as well. FM systems are often recommended for children with hearing loss but classroom speaker systems are available and help the entire class.

Basic communication strategies can help everyone listen more efficiently, especially young students. These strategies can include getting the listener’s attention before giving instruction or changing tasks, making eye contact before addressing the listener, and offering written instruction in addition to verbal instruction. Wonderful resources are available online with communication strategies and low-cost ways of improving classroom acoustics. Empowering the parent with information regarding classroom acoustics, the effects of poor acoustics on learning, and basic communication strategies have been proven to be an effective way of improving our students’ learning environment. Empowered parents lead to empowered teachers which lead to change.


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