

Can Children Hear in the Classroom?

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Educators and politicians have spent a lot of time and money trying to revolutionize education. We are all looking for something new

that will bridge the achievement gap that exists and leave no child behind. But unfortunately, we have all been “looking” for a solution, rather than “listening” to one. And in the process we have unconsciously ignored the foundation of brain development and learning...the ability to hear.

It is amazing to think that children spend up to 75% of their day in school, engaged in auditory learning activities. And yet, until recently, educators, parents, politicians, and taxpayers haven't given much consideration to the children's actual ability to hear in the classroom. In fact, many educators have incorrectly assumed that children can hear the same as an adult. Yet in fact, a **child's auditory capabilities are not fully developed until age fifteen.** Children cannot hear and cognitively process what they hear the same as an adult. All children need a quieter environment and a louder signal (the teacher's voice) in order to understand what they are hearing. In fact, ALL normal hearing children need the teacher's voice to be at least 15 decibels louder than the background noise in the classroom in order to understand what the teacher is saying. In comparison, a normal hearing adult only needs the teacher's voice to be between 4 and 6 decibels louder than the noise for intelligible comprehension. This critical component of acoustics is referred to as the Signal to Noise Ratio (SNR), and it is essential to a child's ability to understand what they are hearing.

The problem is, our classrooms are acoustically poor by all standards. The American Speech-Language Hearing Association (ASHA) and the American National Standards Institute (ANSI) have concluded that the acoustical conditions in our schools are detrimental to all children's ability to hear and learn. The high levels of background noise and reverberation reduce the Signal to Noise Ratio and thus reduce a

child's ability for auditory comprehension. Compounding this problem is the way sound travels. Direct speech; i.e. the teacher's voice, drops 6 decibels for every doubling of distance preventing children in the middle to back rows from achieving the required SNR of +15 decibels. Thus, even the normal hearing child not seated in the front row can miss out on up to one-third of the information.

Another hearing fact that has been overlooked is the significant number of children that have some sort of hearing problem. Estimates range from thirty to fifty percent. While the Special Education group covers the 14.9% of U.S. school children (or approximately 8 million) that have a hearing loss (Niskar et al., 1998), it does not address the additional 18% of children (or approximately 10 million) that have some degree of a Sensorineural Hearing Loss which requires considerably better acoustical environments than normal hearers in order to process and understand speech. Nor does it address the 3 to 6% of children with an Auditory Processing Disorder or the 10-15% of all elementary school children who are experiencing mild hearing losses associated with middle ear infections at any given time. In fact, a study conducted by the federal government found that 43% of primary-level students failed a 15 db HL hearing screening on any given day, and approximately 75% of primary-level children in classes for children with learning disabilities failed a 15 dB hearing screening (Flexer, 1989). Thus, this significant population of school children is at an even greater risk for learning.

Fortunately, there is a solution called a **Classroom Sound Enhancement System (SES)**. The Baltimore County Board of Education recently included \$400,000 in its FY 2007 proposed operating budget towards this technology. This technology works by using an infrared wireless microphone to amplify the teacher's voice (8 to 10 dB) and more importantly, it evenly distributes that voice around the classroom so that ALL students have an equal opportunity to hear and learn. Sound enhancement systems ensure that ALL students, no matter where they are seated, achieve the Signal to Noise Ratio of +15

decibels. They are considered by many to be a necessary educational tool, and in fact, have been mandated for use in all classrooms by Ohio, Michigan, and Florida. Sound enhancement systems cost \$1500 to \$1700 per classroom or \$.16 per student per day. This is roughly the same cost as one classroom computer, yet SESs are utilized many more hours per day.

Sound enhancement systems have been proven over the past twenty years in numerous studies, including those done by the U.S. Department of Education (MARRS), to significantly increase test scores of the ENTIRE school population, including those of “normal” hearing children (minimum 10-15% across the board). Research has also shown that sound enhanced classrooms result in reduced special education referrals (a decline of 43%), reduced teacher absences (up to 40%), reduced costs associated with outside resourcing, and increased literacy rates. The return on investment is so great, that these systems can pay for themselves within 2 ½ to 5 years, which may be why Technology and Learning (Nov. 2004) named it number four on the top ten “Returns on Investment.”

Hearing is the basic foundation of literacy and thus higher level learning for ALL children regardless of socio-economic background or ethnic origin. Therefore, this may be the one academic improvement that truly bridges the achievement gap. It also may reduce the number of children that are currently being incorrectly labeled and unnecessarily medicated simply because they cannot hear; and therefore lose their desire and ability to learn. As normal hearing adults, none of us can walk into a classroom and say that the auditory conditions are good enough because we **DO NOT** hear the same as children. But, we have an obligation to “listen” to what the research is telling us and make a change. For more information, please visit our website at www.ClassroomHearing.org.