

Invisible Pervasive Handicap in the Classroom

By Linda S. Remensnyder, AuD

The majority of a student's time in school is spent listening. To perform adequately, the hearing system must be precise, or deficits and inconsistencies will emerge. This puts pressure on hearing screenings to be performed accurately prior to the student's entry into the school system. The article points out the importance of hearing as part of the learning process. Minimal hearing loss impacts learning in ways undetected by present-day screening methods. In order to develop a robust perceptual system, hearing must become a strong building block, or splintered skills will develop. Students must learn to block out peripheral noise while attenuating the focal 'noise' possessing the desired information. Auditory skills can be trained, although they need to be evaluated properly in order to be defined as a deficit. We must look at the multiple components of hearing and quantify whether a student is having a hearing problem, but also we need to become familiar with how hearing processes bits of information.

— Dr. Robert L. Davis, OD, FAAO

There is a silent epidemic in the schools. Most people, even audiologists, underestimate the number of children affected. However, recent research confirms that, on any given day, one third of all children in kindergarten through third grade have impaired hearing/listening. Certainly, when one thinks of a child who has a hearing loss, one imagines a child wearing a hearing aid. Children who wear hearing aids, and may be language-delayed or speech-impaired, visibly display hearing impairment, but represent a very small portion of that "one-third."

The vast majority of such statistics reflect children missed in hearing screenings. Their ranks are constituted of "normal hearing" children who experience greater speech-recognition difficulties in classroom noise and reverberation than previously suspected. These subtle hearing deficits cause the affected child to experience an invisible handicap — the handicap of not being able to hear well *consistently*. These kindergarten and primary grade children have slight or "minimal" hearing loss for a variety of reasons. Hearing loss contributors can be as trivial as occluding ear canal wax or as serious as otitis media (fluid accumulation behind the eardrums). Ear infections, which apparently have increased by 224% since 1975, cause five million school days to be missed annually. Half of all episodes are undetected by parents or teachers. Even the ventilating tubes resorted to in serious cases can become plugged by infection or debris and thus cause hearing deficits.

The "minimal hearing loss" statistics also reflect youngsters who have allergies causing them to be chronically "stuffed up," with bilateral high-frequency hearing loss in ranges not screened in hearing screenings, or unilateral hearing losses in which excellent hearing is limited to one ear. They reflect youngsters with develop-

mental delays, articulation disorders, or dyslexia, plus students who have central auditory processing disorders (CAPD), attention deficit disorders, and behavioral problems. In addition, the "slight hearing impairment" statistics include children for whom English is not the primary language, since language comprehension requires sustained effort.

Children with minimal hearing loss often pass the preschool, kindergarten, and primary grade school hearing screening. In order to fail, current testing guidelines state that the hearing loss must be of sufficient magnitude and be manifested at specific (but limited) frequencies. It is estimated that present hearing screening procedures identify fewer than half of the children with significant hearing problems.

A "Minimal" Condition with Great Consequences

A "minimal" hearing loss, which requires neither medical intervention nor hearing aids, does not constitute a minimal handicapping condition with minimal consequences, especially during the early elementary school years when the child's brain is assimilating and developing language. Hearing is the acknowledged bridge to reading and to future academic performance. This critical period to learn language is time-locked (generally considered age 0 through 7). Children with minimal hearing losses experience problems hearing faint or distant speech. Flexer (1995) calculates that these children are therefore missing more than 25% of classroom instruction. What 25% of the speech signal do these children miss? They miss the low-intensity sounds — the endings of speech, the sibilants (s, sh, ch) and the fricatives (f, th). They miss the subtleties of speech — the plurals, the tenses, and the possessives/auxiliaries. They miss the hints and the asides, the responses from

classmates in the back of the classroom, and they miss the whispers. They definitely miss what the teacher is saying when the room is noisy, when classmates are conversing, or when the teacher's back is to them.

It is believed that 90% of young children's knowledge is attributable to incidental reception of conversations around them. Thus, learning and understanding are hindered even with the slightest hearing difficulty.

How then, are these children with minimal hearing loss able to learn language when *language is learned by hearing it in full context*? They're not — they're handicapped by their inability to hear well consistently.

It is important to keep in mind that the classroom is a difficult listening environment. Talking students, humming air conditioners, squeaking desks, and outside traffic contribute to a level of background noise that distracts from the teacher's voice. The problem becomes even more significant when the noise echoes off uncarpeted floors in rooms with high ceilings, hard desks, and windows.

According to Flexer (1995), "Children are not short adults; they bring a different 'listening' to a learning situation." Research has documented that children do not develop an adult-like capacity to recognize speech in noise until approximately 13 to 15 years of age — the central auditory system of children is not neurologically mature before then. Thus, commonly reported levels of classroom noise and reverberation can deleteriously affect the speech perception of those younger than 15, even if they do possess normal hearing sensitivity.

Consider the critical link between hearing and reading — maybe that's the real reason why Johnny can't read. *Newsweek* reported on a paper given at the meeting of the National Academy of Sciences, which reported evidence that "Dyslexia arises from abnormalities in a part of the brain (the geniculate nucleus) that processes sounds. If a child cannot properly hear stop consonants, he cannot construct a mental dictionary that keeps track of what letters

sound like. Each letter has to be connected up to this auditory template in the brain."

Teachers are sensitive to impaired or obstructed vision and often ask their students if the letters or numerals on the blackboard are visible. Hearing, on the other hand, is generally taken for granted. Even if a teacher did question students regarding voice audibility, how does a student know what he or she is missing if he or she is missing it? This is very troubling when one considers that children are required to spend at least 45% of the school day in listening activities.


Impact of an Enhanced Signal and Improved Acoustics

It has been confirmed that if the teacher wears a lapel microphone and if his or her voice is amplified via suspended speakers placed in each of four corners of the classroom, all children are able to hear better and all children benefit (even those who wear hearing aids) (Flexer, 1999). These sound field systems simply make it easier to understand or focus on the teacher's voice.

Teachers who use these systems have less vocal strain, are less fatigued at the end of the school day, and have fewer sick days. More importantly, the ability of all children to hear an enhanced speech signal has resulted in improvements in reading comprehension and test scores, fewer discipline and behavioral problems, and increased classroom participation. Crandell (1998) reports that "academic gains in the amplified group were obtained at a faster rate, to a higher level, and with reduced cost when compared to the unamplified group."

Learning enhanced via a sound-field system is a great way to reinforce language development, social skills, and positive self-image. The trend is to place these sound field systems in all kindergarten and primary grade classrooms. Strides are also being made in terms of classroom acoustics, ensuring that new construction and planned renovations take into account the need to limit ambient noise levels. PTAs and school fund-raisers are providing

funding for the technology to promote optimum hearing.

Eventually, a teacher with a microphone will be as commonplace as a performer with a microphone — both need to be audible to retain the audience's interest, but the teacher's need is even greater, not only for current students but for the education potential of future students. 

ABOUT THE AUTHOR

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Editor's Note: *This article is an eye-opener for all those who work with children. It is clear that auditory screenings are not enough — but rather, the first step in ensuring that youngsters with hearing deficits are not "falling through the cracks." School nurses can be instrumental in this process by educating themselves and teaching staff about the subtle signs that a student may be missing crucial verbal information. Once these students are identified, school nurses can advocate for interventions that can only enhance academic success. Taking positive steps beyond the auditory screening process makes sense; it requires our attention — now!*

For more information, contact the Audiology Foundation of America (AFA) at (765) 743-6283 or infoafa@audfound.org. Visit the AFA's Web site at www.audfound.org.