

**Quick Facts about Students, Teachers, Classrooms,
and Active Learning**

- Half of all teachers experience voice disorder at some time in their career, compared to approximately five percent for the general population (University of Iowa National Center for Voice and Speech).
- Children spend 45% of the school day engaged in listening activities (Berg, 1987).
- Children's auditory processes aren't fully developed until their mid-teens (Crandell & Bess, 1987)
- Even in an acoustically 'good' classroom, children 'receive' 83% of a teacher's voice 'signal' when they sit in the front row; 66% in the middle rows and only 55% in the back row. (Crandell & Smaldino, 1994)
- The average grade school student misses 25% of what a teacher says. (Crandell & Smaldino, 1994)
- Signal-to-noise ratio (SNR) is the relationship between a signal (i.e., the teacher's voice) and background noise. Favorable (positive) SNRs mean that the signal is louder than the noise.
 - Young listeners with normal hearing require significantly higher SNRs than adults to achieve equivalent recognition scores (Crandell & Bess, 1987; Elliott, 1979, 1982; Nabelek & Robinson, 1982).
 - To achieve a suitable SNR for children, teachers need to talk approximately 15 decibels (dB) louder than the background noise in the classroom according to recent recommendations of the American Speech-Language-Hearing Association (ASHA, 1995), vs just 6dB for adult listeners. (Crum, 1974; Houtgast, 1981)
 - However, this is rarely achieved throughout the day in a typical classroom. Reports of SNRs for a variety of classrooms range from +5 dB to -7 dB (Crandell & Smaldino, 1994; Webster & Snell, 1983).
 - To achieve an adequate SNR, classroom noise levels should not exceed 35 dBA (Crandell, 1991; Finitzo, 1988); however, typical classroom noise levels range from 41 to 51 dBA (Bess, Sinclair, & Riggs, 1984; Crandell & Smaldino, 1994).
 - Adequate SNR can be achieved when children are seated within approximately 6 ft of the teacher (Crandell & Smaldino, 1994); however, achieving this distance for all children is impossible due to typical class sizes.
- On any given day about 43% of primary level children could fail a basic hearing test because of middle-ear infections (Flexer, Wray, & Ireland, 1989).
- FrontRow classroom amplification products are sometimes referred to as *sound field* systems – wireless voice amplification systems that vastly improve a teacher's clarity so that children in the back of the classroom hear as clearly as those in the front.
- The use of classroom amplification (sound field) technology is the most cost-effective and acceptable means for facilitating classroom listening. (Berg, 1993)
- The first classroom amplification system was developed by Dr. Lewis Sarff in 1977.
- Students in classrooms with classroom amplification (sound field) technology show significant improvements in Scholastic Reading Achievement scores (Mainstream Amplification Resource Room Study; Sarff, Ray, & Bagwell, 1981). This improvement was greater than or at least equal to that experienced by students receiving resource room instruction.
- 96% of teachers have noted improvement in student attentiveness, listening, and comprehension after using an classroom amplification system (Rosenberg, 1996)
- Elementary school teachers surveyed have rated classroom amplification systems their most useful teaching technology (Allen, 1993)
- 92% of teachers noted less emotional strain — and as much as 60% fewer sick days from vocal problems — after using an classroom amplification system (Rosenberg, 1996 & Allen, 1996)
- Spelling scores of 3rd, 4th, and 5th graders have improved by 15%, 12%, and 21% respectively after using an classroom amplification system (Zabel & Tabor, 1996)

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