IMPROVING CLASSROOM ACOUSTICS

Enhancing Listening and Learning Environments
FM Soundfield Classroom Amplification
IDEA, Part B, Special Project

INTRODUCTION

The better children can hear, the more they are able to learn (Ross, 1995). This is precisely the premise of the *IMPROVING CLASSROOM ACOUSTICS (ICA)* project. Listening opportunities for young children are often compromised when they are subjected to less than optimum acoustical educational environments. This is particularly disturbing because young children spend 45% to 60% of their school day involved in the listening process (Butler, 1975). Among the most devastating acoustical barriers are internal and external classroom noise, reverberation, speaker-listener distance, and poor acoustical treatments in the classroom.

For maximum learning to occur in the educational environment, the teacher's voice must be highly intelligible to all children (Crandell & Smaldino, 1995). This is vitally important for young learners with less sophisticated language systems. For pediatric listeners to achieve adult-like speech recognition, the acoustic signal must be approximately 10dB louder than the background noise level (Berg, 1993). Speech recognition in noise and reverberation reaches adult-like performance at 13 to 15 years of age (Fior, 1972; Elliott, 1979, 1982; Neuman & Hochberg, 1983; Crandell & Bess, 1987).

Over the past 15 years research has shown that FM soundfield amplification is an effective way to produce significant change in students' listening behaviors and academic achievement (Sarff, 1981, Ray, Sarff & Glassford, 1984; Crandell & Bess, 1987; Berg, Bateman & Viehweg, 1989; Gillman & Danzer, 1989;Blair, Myrup & Viehweg, 1989; Jones, Berg & Viehweg; 1989; Flexer, 1989; 1992; Osborn, VonderEmbse & Graves, 1989; Allen & Patton, 1990; Benafield; 1990; Flexer, Millin & Brown, 1990; Neuss, Blair & Viehweg, 1991; Schermer, 1991; Ray, 1992; Crandell, 1993; Flexer, Richards & Buie, 1993; Zabel & Tabor, 1993).

An FM soundfield system is a miniature public address system that allows the teacher's voice to be amplified approximately 5 to 10 dB above the classroom noise level. This brings the teacher's voice to all, amplified at approximately the same intensity level. In addition, FM soundfield classroom amplification is a low cost means to improve the listening and learning environment for students and teachers. It is a method of controlling one very important variable in the classroom environment — the intensity of the teacher's voice.

The FM soundfield system helps all of the students some of the time and some of the students all of the time (Ross, 1995). The benefits of FM soundfield amplification are numerous. However, the most notable positive effects students are:

- Improvement in academic achievement
- Improvement in speech recognition
- Improvement in attending and learning behaviors
- Increased seating options for students with hearing loss
- Improvement in listening and learning environments for "at task" learners (e.g., severely language impaired, developmentally delayed, ESOL, minimally hearing impaired, etc.)
- Increased self esteem

Benefits have also been identified for teachers and they include:

- Reduced vocal strain and voice fatigue
- Increased ease of teaching
- Increased versatility of instructional techniques
- Increased teacher mobility