

# The Use of Sound Field Amplification of the Teacher's Voice In the Regular Education Classroom – A Summary of Studies

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## THE MARRS PROJECT: Mainstream Amplification Resource Room Study

**THE CONCEPT:** MARRS is an National Diffusion Network (NDN) project that uses a wireless FM microphone system for soundfield amplification of the classroom teacher's voice in order to enhance oral instruction, lessen teacher voice fatigue, and improve student academic achievement. Amplification of the teacher's voice above background noise is provided to all students in the classroom so that those in the back row can hear as clearly as those in the front of the class.

**THE INTENDED POPULATION:** The MARRS Project was primarily intended as a means of helping students with mild or minimal fluctuating hearing losses compensate for poor classroom acoustics enabling them to remain in the mainstream without expensive referral and identification procedures. Data obtained by MARRS Project staff has revealed that 20–25% or more of the current school population have academic difficulties co-existing with minimal hearing loss (defined as 15-40 dB). If episodes of this degree of hearing loss are frequent, children can miss significant language experience and academic instruction which can cause them to develop learning difficulties that may subsequently require special education services. Education benefits of improved classroom listening via amplification of the teacher's voice have been repeatedly illustrated for thousands of students with normal hearing as well as those students with hearing loss.

**SUMMARY OF BENEFITS:** The quality of oral instruction is enhanced with amplification since all children receive a clear audible instructional signal throughout the classroom, regardless of interfering noise and where they are seated. Teachers using amplification report improved student attention, fewer distractions, and less need to repeat instructions. Classroom management is enhanced and discipline problems are diminished because the teacher has better voice-control of every student in the classroom. Almost all students comment the amplified voice helps them pay attention, better understand oral directions, shut out distracting noises and hear the teacher without straining. The evidence for improved teaching and quality of instruction is reflected in the statistically significant gains in reading and language achievement test scores for K-<sup>5</sup> students included in classrooms using amplification (students with and without hearing loss). These improvements were evident after only one year of use and the improved academic scores have been maintained for as much as 3 years. The amplification was found to be more cost effective than supplementary resource room instruction in: 1) staff utilizations (requiring fewer personnel to achieve the same or superior academic growth), 2) lower initial and continuing educational costs and 3) personal costs to students who avoided the stigma, segregation and restrictions of special placement.

## RESEARCH RESULTS – in brief:

· 1) In 1981, at the end of the original 3 year MARRS study, data was analyzed for three treatments of identified target students. The MARRS study found that approximately 30% of children in grades 3-6 failed a 15 dB hearing screen. These target students were divided into three groups: 1) typical classroom settings, 2) regular classroom instruction with supplemental resource room instruction, and, 3) regular classroom instruction with sound field amplification of the teacher's voice. Amplification of the teacher's voice resulted in significant improvement (>.05 level) in academic achievement test scores of the minimal hearing loss students. These gains were achieved at a faster rate, to a higher level at a lesser cost than gains achieved by students in the more traditional resource room model typically utilized for students requiring special help. Increases in test scores ranged from 1/3 or over 1 standard deviation. The significant increases were not observed in scores of students in their resource room in the same time interval. The significance of the findings in the MARRS study is that for some students with minimal hearing losses, significant educational instruction effects can be achieved by sound field amplification. Furthermore, these gains can be cost effectively realized within the regular classroom without the need for

stigmatizing labeling and segregation as well as expensive and scheduling complications of special class placement. National Diffusion Network recognition of the MARRS Project as an exemplary educational program was granted in 1981.

· 2) In 1982, a study investigated the effects of sound field amplification on the test taking performance of 131 second and third grade children having either a minimal hearing loss or normal hearing. Also, a behavior rating scale completed by the classroom teacher was correlated with the two groups. The results indicated improved performance on a dictated spelling test for students having minimal hearing loss. The behavior scale had a negative correlation, indicating students with a minimal hearing loss were viewed by the classroom teacher as impulsive, overactive and having a weak attention span.

· 3) In 1983, the listening ability of kindergarten students under close, distant and sound field amplification was explored. Students with minimal hearing loss (15-40 dB) were identified. A high fidelity tape recorder was placed on the teacher's desk and presented words that students were to identify from 25 multiple choice items by placing an X on the appropriate picture. When the teacher's desk was at the front of the room (average of 12 feet from students), the normal hearing children achieved an average listening accuracy of 91% and the children with hearing loss had an average score of 81%. With the teacher's desk in the center of the classroom (average of 6 feet from the students), scores improved to 98% and 96% for the normal and hearing loss groups respectively. When word were presented via sound field amplification, scores for both groups averaged 98%. Reported results indicated: 1) students with minimal hearing loss do not listen as effectively as normal hearing students from a distance in a kindergarten classroom with "good" acoustical conditions, and 2) listening problems may be alleviated wither by a teacher moving up close to students or using amplification equipment.

· 4) in 1986, data were gathered from 40 public school classrooms in grades K-6 from sites in Illinois, Kentucky, Minnesota and Missouri. Students with minimal hearing loss were identified at each site and placed at random in amplified classrooms or control (non-amplified) classrooms. Data from each site contained the pre-test and post-test for each target student from the amplified and control groups. It was found that students achievement tests of reading and language ( $P < .05$ ). This was true across the site, grade, and measurement scale used. Subjective results revealed 85-90% of teachers found the system beneficial to themselves and to students judged the system to be beneficial to them in improving their ability to hear and to help in their schoolwork and 90% of administrators surveyed had positive responses to questions assessing the effectiveness of amplification use.

· 5) In 1990, after 60 sound field amplification units had been phased in over a 5 year period it was found that the number of students placed in LD programs had declined nearly 40%. Also, findings indicated that 43% of students had minimal hearing loss on any given day and approximately 75% of primary-level children attending LD classes also did not have normal hearing. Using the Iowa TBS to evaluate achievement the following was noted: the amplified Kindergarten shoed the most dramatic results with significantly higher scores on listening, language, and work analysis. The amplified Grade 1 classes showed superior performance on work analysis and vocabulary. The amplified Grade 2 classrooms showed better scores on math concepts and computation, and the amplified Grade 3 classrooms showed superiority on math computation concepts and reading. Formal classroom observations indicated that students in amplified classrooms had better student production and on-task behaviors. Principals also noticed fewer teacher absences due to fatigue and laryngitis.

· 6) In 1990, children with developmental disabilities in a primary-level class utilizing sound field amplification made significantly fewer errors on a word identification task than they made without amplification. Children were observed to be more relaxed and responded more quickly in the amplified condition.

· 7) In 1993, children with ongoing hearing loss and histories of chronic ear problems were identified in 12 classrooms. The teachers, who were unaware of the target students, completed S.I.F.T.E.R. educational screening forms for all students in 6 amplified and 6 un-amplified classrooms. Results showed that about on-third of the children have early and continuing hearing problems. Most important, children benefit from classroom amplification, whether or not they have hearing problems.

· 8) In 1994, the listening abilities of children who have learned English as a second language were studied under amplified and non-amplified conditions. Results indicated that ESL students experienced significant difficulty understanding spoken English in a typically noisy classroom environment. Significant improvement in understanding ability of ESL students was revealed under amplified classroom conditions.

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