

# Using Sound Field FM Systems To Improve Literacy Scores

By Beata Darai, AuD, FAAA

According to the 1994 National Adult Literacy Survey (NALS), between 40 and 44 million Americans are unable to read and another 50 million are limited to a fourth or fifth grade reading level.<sup>1</sup> School systems and national educational groups are reacting to this statistic by concentrating efforts on literacy and improving the way reading skills are taught to students.

Appropriate classroom acoustics and a favorable signal-to-noise ratio are vital for all instructional coursework, especially reading. The phonetic markers for identifying words from one another and the correct pronunciation of unknown words are just two examples of the strong reliance hearing plays in reading instruction. However, few have acted on this knowledge to make changes in the classroom environment.

I investigated the impact of classroom amplification on literacy measures among 166 first-grade students (85 research and 81 control subjects) as an AuD student at Nova Southeastern University in Ft. Lauderdale, FL. I found that students in classrooms with an FM system achieved greater literacy gains compared to control students. This demonstrable connection between classroom amplification and literacy can benefit students, teachers and educational audiologists.

My project focused on first-graders, who are making the transition from emergent to real reading skills.<sup>2</sup> I used the Informal Reading Inventory (IRI) as a measure of literacy achievement, utilizing the instructional reading level at the mid-



Sound field FM systems can contribute to literacy success when incorporated into the classroom. (photo/courtesy Beata Darai)

dle and end of the year to establish literacy growth. The Teacher Appraisal of Listening Difficulty inventory of the Listening Inventory for Education (LIFE) was used to identify changes in attention, classroom participation and learning as a result of classroom acoustic intervention.

Eight first-grade classrooms in the Broward County (FL) Public School System participated in the study. Students enrolled in this system include those native to South Florida and other states, as well as 17,623 students with limited English proficiency from 164 countries speaking 54 different languages.<sup>3</sup>

I chose one experimental and one con-

trol classroom from each of four elementary schools. The eight experimental classrooms were selected based on teacher and principal compliance and similarity of classroom ambient noise. For a period of five months, four experimental classrooms used a classroom FM sound field system. The remaining four classrooms served as controls.

Each sound field system consisted of a box receiver, transmitter, boom microphone, and four speakers installed to manufacturer specifications. All of the classroom teachers were asked to make no alteration to their teaching style or format. The four experimental classroom teachers

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received instruction on the use of the amplification device and were told to use the FM system during teaching periods.

I found a statistically significant difference ( $p < .027$ ) between the experimental and control groups as displayed by the average ranks of their members. Students in the classrooms with an FM system achieved greater literacy gains than control students as measured by IRI literacy scores.

A similar number of experimental (32 out of 85) and control students (38 out of 81) achieved literacy growth of one to two reading levels. However, a dramatically larger number of research students (28 out of 85) achieved as much as seven reading levels of literacy growth as compared to the control students (13 out of 81).

The increase of literacy performance was more remarkable for bilingual and special education students in the amplified classrooms. The positive results for special education students and students with hearing concern, however, have to be viewed cautiously given the small sample size of these students.

The LIFE appraisal forms completed at the conclusion of this project overwhelmingly suggest support for the positive change made by the improved classroom acoustics. The use of the sound field FM system was considered to be highly beneficial by all research classroom teachers. The written comments and observations of experimental classroom teachers further reflected the success of the acoustic modifications.

One teacher involved in the experimental group reported her students were "more attentive to her voice." She found that she "did not need to repeat directions as often and her voice was less strained."

A second teacher from that contingent reported being able to "use a quieter, gentler voice for attention and emphasis in her teaching." As a result, this teacher "experienced less voice strain, allowing her to be less tired, tense and frustrated."

Teachers overall reported that the improved classroom acoustics facilitated phonics and language instruction. The anecdotal participant observations confirm that experimental teachers and stu-

dents preferred the listening and learning environment provided by the sound field FM system.

Students reported a preference for use of the system by teachers for all classroom, particularly storytelling. On occasions when they forgot to wear their microphone first thing in the morning, teachers reported that students were always quick to point out the oversight. A resounding tone of disappointment was evident in all classrooms when the equipment had to be collected at the conclusion of the research project.



The results confirm that classroom amplification can provide significant improvement in the literacy achievement of first-grade students. In this study, students in the amplified research classrooms statistically outperformed comparable students in a non-amplified control classroom.

The most significant limitation of this research was the short implementation period of five months and the small sample size of subjects.

This project underscores the need for readdressing the classroom environment to maximize students' listening and learning ability. Continued exploration of this subject promises to be of great value to the academic success of all students—those who have hearing impairments and

those who do not. Countless variables contribute to the academic success of children in the area of literacy. Improving the acoustics in a classroom may be one variable worthy of further exploration.

School systems and national educational groups are reacting to poor student literacy skills by concentrating efforts on improving the way reading skills are taught. A number of initiatives has been enacted within my school system to address improving literacy learning for school-age children, including changes to the curriculum, teaching style and method. Despite these concentrated efforts, the classroom environment in which the teaching takes place has not been recognized as a component to literacy success.

The Broward County Public School System accepted my analysis as an action research project. I will continue using sound field FM systems and expand the study to address the limitations identified in the initial project phase.

This research demonstrates the contribution of educational audiologists, who should be viewed beyond the clinical scope of practice. Audiologists in the school system can and do influence academic success of children in more ways than assessing hearing ability alone.

#### References

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*Beata Darai is an educational audiologist for Broward County Public Schools, North Central Area Office, 600 SE Third Ave., 5th Fl., Ft. Lauderdale, FL 33301. The author acknowledges Phonic Ear, which provided the equipment for the study, and Barry Freeman, PhD, her mentor at Nova Southeastern University.*