Research Summary

With two million SMART Board™ interactive whiteboards installed worldwide and more than 40 million students actively learning with SMART products every day, SMART can be found in every U.S. state, every Canadian province, every Local Authority in the UK and more than 175 countries. To demonstrate the effects of educational technology on teaching and learning, many educators have initiated research studies.

This research summary presents findings from studies that explored how various classroom amplification systems are being used to improve learning outcomes.

Classroom Acoustics for Children With Normal Hearing and With Hearing Impairment

Crandell, C.C., and Smaldino, J. J. (2000). Classroom Acoustics for Children With Normal Hearing and With Hearing Impairment. *Language, Speech, and Hearing Services in Schools*, 31, 362–370.

Past investigations demonstrate that the acoustical environment of a classroom is a critical factor in the academic, psychoeducational, and psychosocial achievement of children with normal hearing and with hearing impairment. This article examines several acoustical variables, such as noise, reverberation, and speaker-listener distance, which can deleteriously affect speech perception in classrooms. Moreover, the discussion examines the effects of these variables on the speech perception abilities of both children with normal hearing and children with hearing loss.

The research addresses several of the important acoustical variables, including noise, reverberation and distance, which are commonly present in classrooms. Results of this research show that commonly reported classroom acoustics can have an adverse effect on the speech perception of children with sensorineural hearing loss and normal hearing sensitivity (p. 369).
Link to the article.

Classroom Amplification to Enhance Student Performance

DiSarno, N.J., Grassa, P. & Schowalter, M. (2002). Classroom Amplification to Enhance Student Performance. TEACHING Exceptional Children, 34 (6), 20–26.

Many educators have shown that classroom amplification can be useful in a variety of settings, including the general classroom, classrooms for students with hearing impairments and classrooms for students with learning disabilities. This study looks at the factors contributing to this and compiles research that has been completed on the subject.

"Research has shown benefits from the use of amplification devices in classrooms of students who demonstrate learning disabilities, as well as in regular classroom settings. Results of studies show that the listening and attending behaviors of students improved after implementation of amplification systems." (p. 1)
Link to the article.

Benefits of Sound Field Amplification in Kindergarten through Grade 3: A New Brunswick Provincial Study

Aquino-Russell, C. Flagg-Williams, J. & Rubin, R. (2007). Benefits of Sound Field Amplification in Kindergarten through Grade 3: A New Brunswick Provincial Study. Presented at the *2007 CASLPA Conference* in Moncton, New Brunswick.

This study explored the use of infrared sound-field amplification technology in K–3 classrooms in New Brunswick. It investigates the effects of amplification on communication during English classes. Methods included both quantitative and qualitative design. In addition, teacher and student feedback was sought about the perceptions of classroom amplification.

Results show that with regard to teacher cues, teachers spent less time directing instruction to students for maintaining attention or repeating instructions (p. 3). Teachers stated that students were more attentive and that students' statements directed to peers decreased while students' responses to teacher's statements directed to the whole class improved (p. 6).

The flow of communication in amplified classrooms improved over that of rooms without amplification in most areas studied. Increased efficiency in classrooms included better responses from statements directed to individual students and a reduced need for direct cues. Teachers stated that they used time more efficiently and that less repetition was needed (p. 6).
Link to the article.

Using Classroom Amplification in a Universal Design Model to Enhance Hearing and Listening

Millett, P. (2009). Using Classroom Amplification in a Universal Design Model to Enhance Hearing and Listening. *What Works? Research into Practice*, Research Monograph #23, 1–4.

While sound field amplification systems do not in and of themselves reduce noise levels, lower noise levels are often experienced when these systems are employed. The cycle of teacher and students raising their voices to be heard is broken, and students are more engaged and attentive. These systems meet virtually all of the requirements of universal design: they provide equitable use (everyone benefits equally with no stigma attached to an individual student), require little physical effort, and are easy to use.

"Sound field amplification systems increase students' ability to hear and listen, improve acoustical environments and alleviate teachers' vocal strain. They are easy to use, cost no more than other technology used in the classroom, and are an outstanding example of how universal design principles benefit everyone." (p. 4)
Link to the article.

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

The MARRS Project. T*he Use of Sound Field Amplification of the Teacher's Voice in the Regular Education Classroom – A Summary of Studies*. Retrieved from classroomhearing.org/research/marrsStudy.html.

In this study, 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–12 students with and without hearing loss included in classrooms using amplification. These improvements were evident after only one year of use and the improved academic scores have been maintained for as much as three years.

Results show that the quality of verbal instruction is enhanced with amplification because students receive clear, audible instructional signal throughout the classroom, regardless of other noises or of where they are seated. The teachers reported improved student attention, fewer distractions and less need to repeat instructions. Almost all students commented that the amplified teacher's voice helped them pay attention, better understand verbal directions without distracting noises and hear the teacher without having to strain (p. 1).
Link to the article.

Creating Enhanced Learning Environments: The Benefits of Sound-Field Amplification Systems

Heeney, M. (2004). Creating Enhanced Learning Environments: The Benefits of Sound-Field Amplification Systems. The Oticon Foundation in New Zealand.

This study aimed to establish whether sound-field amplification significantly improved educational achievement in the areas of listening, reading vocabulary, reading comprehension, mathematics and phonological awareness, if it was particularly useful for children of certain socioeconomic backgrounds, ethnic groups and for those who have a history of middle ear dysfunction ("glue ear"), and if it made a difference in teachers' health or absenteeism.

Results show that sound-field technology improves learning and literacy outcomes, creates enhanced classroom harmony, improves student behavior and reduces vocal strain for teachers. Sound-field achieves this by overcoming problems associated with noise, distance and reverberation (p. 5).

"Sound-field technology is one of the most cost-effective interventions a school can invest in to increase literacy outcomes." (p. 5)
Link to the article.