

Class of BB'93

Integrating audio systems into the classroom is now proving to dramatically advance children's academic performance. Chris Edwards examines the benefits and opportunities for 'Sound Field' systems in schools...

Children spend at least 45% of their school day engaged in active listening activities, with today's classroom acting as a primarily auditory verbal environment. However, a recent study in the Journal of the American Medical Association showed that 14.9% of children aged 6~19 have some degree of hearing impairment. Studies further show that 80% of young learners will have some form of fluctuating hearing loss during the academic year.

In response to such findings, the recent Department for Education & Skills (DfES) paper – **Building Bulletin '93** – sets legislative standards for the acoustic design of new schools. Highlighting the significance of 'Sound Field' voice reinforcement as an ideal solution to acoustic performance in the classroom, the BB'93 recommendations ensure effective levels of speech recognition for children in a learning environment.

Not to be confused with the many other products and uses for the term 'soundfield', BB'93's "Sound Field Systems for Schools" refers, quite simply, to the use of a wireless voice reinforcement system in the classroom. The teacher is provided with either a headset or lapel microphone which is linked to a wireless receiver, amplification and loudspeaker system. Providing low level voice reinforcement, Sound Field systems are designed to provide 'voice lift' – raising the level of the teacher's voice without drawing attention away from the original point source (i.e. the teacher!). Consultant and Principal Contributor to BB'93, Sam Wise, has noted a marked increase in the use of Sound Field Systems in the United States over the past 15 years and now sees its integration into the UK classroom as a significant opportunity both for academic performance and, of course, the audio installation industry.

“The use of Sound Field allows all children in a learning environment to share the same experience, including not only the amplified sound but also normal verbal communication and other sounds generally around them. This differs, of course, from other auditory aids such as student-worn headphones where ambient sound and communication is removed.

“Under quiet conditions, most teachers will have enough strength in their voice to communicate with and control groups of children the size of a school class, even for the length of a full day’s teaching of around six hours. However, often lively, noisy classes can make clear, consistent and effective communication with all class members difficult – a Sound Field System helps to raise the sound level of the teacher’s voice and distribute it evenly, yet unobtrusively, throughout the room.”

The publication of BB’93, Section 6 highlights the many benefits of Sound Field systems in the classroom for young and hearing-impaired learners, as well as teachers themselves stating that: *‘During the early years of language development, particularly up to age nine, children do not have the language experience that allows adults to decipher messages amongst interference... young children must hear and understand more of what is said to them to be able to decode the meaning.’*

Whilst researching into the recommendations for BB’93, a wide range of academic improvements were observed resulting from successful use of Sound Field Systems. Sam Wise again: “We visited several example schools in the UK using Sound Field systems and interviewed the staff. At primary school level, the benefits extended beyond the hearing impaired pupils to include everyone, since all were said to have improved speech development and discipline. The latter stemmed mainly from the teacher...being audibly ‘all over the room’, even while dealing individually with children.”

Providing expert advice in Audiology, BB’93 contributor Russell Brett is currently completing his PhD in the Examination of the benefits of Sound Field in mainstream primary schools in the UK. “After one year of using a Sound Field system, we saw improvements in all learning areas tested – vocabulary scores, discursive language, sentence length, reading and mathematics. Results also showed clear improvements in attention and class participation. A questionnaire of primary school

teachers showed that 70% of Reception and Year 1 teachers would **unconditionally** support the use of a Sound Field system in the classroom”

Building Bulletin '93 further states that:

‘All children benefit from improved speech clarity, not only those with permanent or temporary hearing loss. Academic performance has been shown to improve for all class members with improvements noted in task behaviour, attentiveness, understanding of instructions, less repetition required, better attendance and improved levels of verbal recognition.

‘Furthermore, due to the clarity of speech from the teacher, similar improvements in learning performance are also noted in students for whom English is a second language.’

A number of US studies to test Sound Field’s effectiveness back up these observations. In a study of 8~10 year old students to test the effectiveness of Sound Field voice re-inforcement in the classroom, students showed an average improvement in identified spoken words of 45% using the systems. Furthermore, when tested without Sound Field, the children missed an average of 42% of the questions.

Within the school utilised for the test, the principal, teachers and students completed questionnaires, with results stating that overall attention spans improved, students followed the directions more easily and they showed less hesitation when beginning their work. The majority of students said it was easier to hear the teacher and that the teachers did not have to yell or raise their voices.

In line with the DfES equipment recommendations for Sound Field, most wireless microphone manufacturers have developed complete package systems to meet the demands of differing classroom applications. With a choice of either RF or infra red wireless transmitters and either installed or portable systems, there are a wide variety of solutions already on the market, providing a range of different benefits.

BB'93 has increased the significance of the educational environment as an opportunity for audio installers to a new level, comments Kevin Sherwood of CIE-Audio.

"In conjunction with Armstrong i-ceilings and Chiayo Microphones, we have just launched our latest initiative, 'ABLE – A Better Learning Environment' promoting the passive and active benefits of our educational product portfolio for improved academic performance. Among our Sound Field specific solutions, we've combined the acoustic and aesthetic characteristics of i-ceilings NXT loudspeakers with the benefits of Chiayo's latest infrared products. Needing fewer i-ceilings panels per classroom than conventional loudspeakers, the system provides the installer with a virtually 'invisible' loudspeaker option and secure sound reinforcement." Infrared transmitters, of course, limit the signal to the confines of the room, allowing multiple systems to be used in adjoining classrooms without the requirements for frequency allocation or site licences.

"We also have a smaller infrared system, the Chiayo IR, which is completely portable, allowing for the unit to be easily transported from classroom to classroom, or even site to site should it be required by specialist or supply teachers."

Trantec are also placing a significant emphasis on the opportunities of Sound Field, following the in-house development of their S10 system. Rob Piddington of Trantec suggests "Sound Field systems not only benefit the student, but also help to minimise the stress levels on teachers by delivering evenly distributed sound across the classroom, without the need to raise or strain their voices. Stress or illness in the teacher, of course, effects the whole class and reductions in absenteeism in the teacher are just as important as that of the students.

"Our latest S10 has been developed by our R&D team to help make the teacher's life as easy as possible, as well as helping the students have a clear vocal understanding of what is being taught, so every party involved is a winner ". The S10 comprises a lightweight VHF beltpack transmitter and lapel or head-worn microphone. The transmitted signal is recovered by the combined receiver/amplifier and distributed to a choice of 4 wall or ceiling mounted loudspeakers.

The Sennheiser EMP 2015 uses UHF technology to provide interference-free operation of up to 80 Soundfield systems in one school. Offering connection for up

to eight loudspeakers for extra large spaces and two audio inputs for AV equipment and additional RF links, the EMP 2015 is a useful addition to any classroom and will more than repay the investment in a short time.

Though the benefits of a Sound Field System are very clear and BB'93 legislation emphasises a clear requirement for improved voice reinforcement in the classroom, the difficulty for these products may lie in the perceived "continual financial pinch" educational development finds itself.

However, funding for education is, in fact, currently at its highest in recent history, receiving investment from a variety of government and private initiatives. Funding on a grand scale using Public Private Partnerships (PPP) and Private Finance Initiatives (PFI) provide significant capital to build and operate new educational facilities in areas where refurbishment is not financially viable. According to the latest Eurostat figures, without including budgetary development for refurbishment (a significant market which should not be ignored!), investment in new build educational projects has risen by 224% in just 4 years and is predicted to rise by a further 131% to 8.4billion Euro in 2005.

In striving to plan successful academic programmes teachers, architects, audio designers and installers need to consider the sheer numbers of students who may not hear well on a given school day.

With the backing of DfES legislation, the public and private funding of organisations such as LEAs, Government Revenue Support Grants, County Councils, Lottery Grants, New Deals for Schools and PTAs, Sound Field Voice Reinforcement Systems are an easy, cost effective solution, ensuring all students listen and learn productively throughout the school year, whilst opening new and lucrative opportunities for the installation industry into the educational environment.