

**Australian Government Department of Education and Training  
More Support for Students with Disabilities 2012-2014**

## **Evaluation Case Study**

### **Using sound enhancement systems to engage children with hearing impairment**

MSSD Output 1: Providing assistive technology  
MSSD Output 2: Training in assistive technology

**Northern Territory  
Department of Education**

# Using sound enhancement systems to engage students with hearing impairment

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## Abstract

The Northern Territory (NT) Department of Education (DoE) provided augmented and assistive technology to enhance the sound environment of classrooms with significant proportions of children with hearing impairment. The case study school in central Australia has a history of over 30 years of supporting students with hearing loss/impairment. An Assistive Technology grant in late 2012, through the More Support for Students with Disabilities (MSSD) initiative, enabled the school to install sound field systems in all the junior school classrooms, from Transition to Year 2/3, to assist students with hearing impairment to hear the teacher and participate with other students in classroom activities.

## Key elements and actions

The Northern Territory (NT) Department of Education (DoE) provided augmented and assistive technology to enhance the sound environment of classrooms with significant proportions of children with hearing impairment. This addresses a major issue in the NT since the incidence of hearing impairment in Indigenous students is particularly high with approximately 66% of Indigenous children diagnosed with at least one type of middle ear condition, 53% with some form of hearing loss, and 33% have a hearing impairment. Approximately 11% have moderate, severe or profound hearing impairment.

The purpose of introducing sound systems in classrooms is to make it easier for students with hearing impairment to engage in learning and interaction with teachers and peers and improve their learning outcomes. The case study school is a government primary school with a student population of 310 students, including students from remote communities who attend the school when their families are in town. The majority of the students with hearing loss are Indigenous students: many of them are also students for whom English is an additional language or dialect (EAL/D).

## Needs assessment

The first step for the school was to assess the extent of the challenges. It embarked on a process of hearing assessment, in partnership with Australian Hearing and Hearing NT, to determine the number of students with hearing impairment across the school. Seven different types of hearing impairment were identified. From previous experience, the school was confident that the approach of installing sound field systems as a tool to improve the learning environment, together with good teaching practice, would make a difference for students with sensorineural hearing loss and for the considerable number of students with conductive hearing loss caused by Otitis Media or related disease.

## Establishing clear objectives and expectations

The school set out clear objectives and expectations to guide teachers and support staff in the implementation process. The main objective is to enhance learning outcomes for students with hearing impairment and EAL/D students by creating an environment where they can clearly hear teacher instructions and engage with group discussions. The school expected that

the enhanced sound system would first and foremost improve student attentiveness, participation, comprehension, concentration, phonemic awareness, language acquisition and assessment results. The school also assumed the sound system would benefit all students by reducing the occurrence of disruptive behaviour that hampered effective learning for all students and ultimately improve learning and life outcomes for students with hearing impairment.

### **Selecting and installing a sound field system**

Sound field systems are designed to enhance the audio environment in classrooms. They comprise a wireless transmitter with a boom microphone, a hand-held student microphone and a column speaker. The DoE provided an Assistive Technology grant through the MSSD initiative.

The school opted for the best possible system it could afford and decided to give priority to the junior levels and installed the systems in the Transition to Year 2/3 classrooms. In 2012, the case study school put two sound field systems into operation. For example, in one classroom the system is located at the back of the classroom, with an interactive whiteboard opposite at the front of the room. Students' desks are located between the whiteboard and the system but the class moves to the back of the room next to the system for group lessons. This layout maximizes the impact of the system by positioning students directly in the line of sound.

The school now has sound field systems in all classrooms, from Pre-school to Year 6. Funding for addition systems has been provided by the Variety Club and from School Council funds.

### **A whole school approach**

The principal and executive team ensured a whole school approach to implementation, including support in the form of articulating the principles of equity to underpin a whole school approach to the inclusion of students with hearing loss/impairment. The initiative was closely aligned with the strategic directions of the DoE with a system of management in place, led by the school's Special Education Manager. The school also provided family liaison, with support from the Parent Liaison Officer to liaise with families and encouraged collaboration more broadly, with Principal support for active sharing of practice with the regional Special Education Teachers' Network.

### **Strengthening teacher capability**

The school took a number of steps to strengthen teacher skills in the use of the sound field system. Information folders were prepared to assist classroom teachers who were also provided with individual assistance and technical support from designated staff within the school. Teachers also had access to professional learning and specialist support and advice through the regionally based Hearing Adviser, NT DoE. The support extended beyond the use of sound field systems to related issues concerning making educational adjustments for students with disability.

The use of sound field system technology was also included on the agenda of regular staff meetings with time for discussion on teaching practice, what is working well, and what is needed for further professional learning in the application of sound field systems. Teacher capability has been enhanced with the use of evidence-based practices to inform decision-

making along with a monitoring and review process conducted by special education staff through meetings held twice per term.

## **Lessons learned**

### **Key observations**

The immediate outcomes of the assistive technology met the expectations of the school. The successful implementation of the augmented and assistive technology rests firstly on being embedded with a clear school ethos supporting inclusion of students with disability. Capacity is strengthened when the ethos is clearly articulated by the executive leadership, and implementation supported by a whole school approach. In the last two years in particular, the school has taken a more rigorous approach to the identification of students with hearing loss, database management, and the monitoring and review of student learning behaviours.

### ***Changing teacher approaches to pedagogy***

Teachers were conscious of significant changes in their approach to teaching as a direct and sometimes unexpected outcome of the use of sound field systems. They report being able to focus more strongly on teaching and learning and time on task without disruption. Classrooms are calmer, more positive learning environments and as one teacher observed:

*I have already noticed the difference the system has had on one of our EAL/D students. This student has made progress in enunciating initial sounds in a very short period of time. The system has assisted him to clearly hear each sound. He is now able to enunciate sounds correctly that he could not before. His confidence has grown and his speech has also slowed down.*

Teachers also report that they now give greater attention to their communication since the use of the microphone has made them more self-conscious of the need to give clear instructions to all students. They have seen their confidence grow more generally with respect to using technology as a tool to enhance learning. They also acknowledge some unanticipated workplace health benefits, such as less voice strain and less stress about whether students can hear them clearly.

*At first I was hesitant to use the system because it was something else I needed to learn and add to my teaching routine. However, once I started using it, I was surprised by how easy it was to use.*

### ***Changes in student behaviour***

Teachers report that students with hearing impairment are able to hear sound in the classroom and are better engaged in learning. They point to improvements in learning outcomes for these students and for others as well. The most fundamental change with the greatest impact is that the students with hearing impairment spend more time on learning tasks:

*The system really helped students to listen and learn. One student who is hearing impaired used to be quite distracted during mat time and would often ask me to repeat instructions. Since I began using the sound system, he sits right next to it and hears everything clearly.*

Improving the quality of sound means that children with hearing impairments are less likely to be bored and distracted and therefore pay greater attention to their learning. They have also demonstrated improved social skills and engagement with others.

### ***Impact on whole class***

The enhanced sound quality in the classroom has had the unanticipated benefit of improving the attention of all students in the classroom. Students show great enthusiasm for and enjoyment in using the microphone in the classroom, and are reported to be speaking with greater confidence in groups:

*The students really like using the microphone. We use it for news and circle time. Some of the more reluctant talkers are happier to offer something using the microphone.*

*...students pass around the student microphone. All the students listen more attentively during this time.*

The integrated approach adopted by the school has facilitated improved student communication and learning in the classroom, and increased the skills and confidence of staff in improving the learning environment for students with hearing impairment, and indeed all students.

### **Sustainability**

The use of sound systems to engage students with hearing impairment in the classroom has demonstrated immediate and tangible effects. Installing and operating the assistive technology is generally straightforward but it does require teachers to make some significant changes to their approach to instruction and classroom organisation. Once the assistive technology is installed the major issue for sustainability is to ensure regular maintenance of the equipment and induction processes are in place for newly arrived teachers. The prospects for sustainability are high if the use of the system is underpinned by an ethos of inclusiveness embedded in the everyday operations of the school. Teacher confidence in the use of the system is likely to be assured if whole of school commitment and systematic management remains a priority.

### **Potential for adoption in other contexts**

Installing and using sound enhancing technologies in schools can be adopted or adapted in other contexts. Aside from the costs of the initial outlay, there are no major obstacles to introducing these forms of assistive technologies. The sound enhancement technology has the obvious advantage of directly targeting a specific set of issues for students with hearing impairment preventing learning and reducing the quality of the classroom experience. A variety of options are available to ensure the system is appropriate to meet the identified needs but this also requires a systematic analysis of the nature and extent of student needs to ensure fitness for purpose.

### **Notes**

The case study involved two site visits at the school in 2014. They included interviews with the school principal, specialists and classroom teachers.