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Listening to the future

How can technology be used to support deaf children's education?

Ken Carter takes us on a lifetime's voyage of technological discovery

For over 50 years I have been involved with the challenges of deafness through having a profoundly deaf daughter. Indeed, it was this reality that led me, initially, to become a teacher of the deaf. As a young parent and teacher, I was very confused and slightly bewildered with the issues surrounding the oralist approach to teaching deaf children – which concentrated on making maximum use of residual hearing, lip-reading and articulation – and the use of sign language. The teacher's course that I attended did not permit its students to use sign language, but perpetuated the use of hearing aids, auditory training and speaking clearly and at conversational levels (60dbs).

It did not take me long to realise, though, that the world was changing. Newly emerging computers and

telecommunications were slowly being introduced into the business world, though not into the world of education. In addition, about one hundred years after Alexander Graham Bell invented the telephone, deaf children and adults were now able to communicate over public telephone lines. This delay had created a very real disadvantage in terms of social, educational, training and employment advancement for the deaf.

In 1973, the first telephone call between two deaf people was made in the UK. They used a teletype machine and the Phonotype system invented by deaf American scientist Robert Weitbrecht. By the end of that year, there was a network of about 15 Phonotype units. By 1978, there were 165 Phonotypes in use throughout the UK. In 1981, the Vistel 1, the visual telephone, was introduced. As

This programme could not have happened without the internet

technological change accelerated, the Vistel 2 was introduced, enabling back-to-back and email contact, as well as giving more memory, word processing and answerphone facilities.

Bringing deaf students together

It was because of the experience of being involved with the introduction of these technologies, and visits to California State University, Northridge, USA, that I set up Deafax, an educational enterprise (charitable company) to address how different kinds of telecommunications technology could help to improve the education of deaf children, with a special focus on literacy and communication. To start with, we organised the Deaf Students Can Conference which was funded by the European Union, to assemble together deaf students who wanted something better for themselves and the next generation of deaf children. A follow up conference, Deafness and Technology, brought together academics, teachers, researchers and deaf students to explore what technologies were being used worldwide and what could be used by them for the benefit of deaf children. This led to a project with telephones for deaf children, using minicomms and fax machines to link groups of deaf children together in a buddying scheme, helping to improve writing and literacy skills



Webcams and video conferencing enabled greater collaboration across the deaf community.

as well as breaking down barriers of isolation by creating a network of deaf children around the world.

This International programme inspired parents, teachers and deaf children to expand their vision of what was possible to challenge existing stereotypes. A number of modules were developed which were used for training purposes in India, Barbados, Australia, New Zealand, USA, and the Irish and Czech Republics. This programme could not have happened without the internet. It was important that we worked with teachers of the deaf from these countries so that their parents and deaf children could be part of the technology revolution which was slowly making an impact on the process of inclusion. The email was to create a pen pal scheme as well as a mentor scheme, where high achieving deaf adults would share their stories and experiences so that deaf children could be inspired and learn from their experiences.

Developing specialist support

One of the outcomes of these information and communications technology (ICT) projects was that the British Government recognised that different groups of children needed different types of specialist support. The Deaf Children's Communication Aids Project (DCCAP) was created by the British Association of Teachers of the Deaf (BATOD) and Deafax, and funded by the Government to run for five years. This project worked closely with schools for the deaf and hearing support units throughout the UK, testing and trialling new hardware and software and making sure that deaf children were given expert and dedicated technical support.

It became quite obvious once again that there needed to be an expansion of relevant resources, creating new software and training packages on a deaf-friendly visual theme. The memory



Handheld devices provided instant access to communication media.

capacity and processing power of the computer had so improved that using video footage of signing was possible. It became important that all materials needed to be visual with support from British Sign Language (BSL) and spoken English.

One of the best developments was testing and trialling the introduction of

There was still a worry that a linguistic gap existed between deaf and hearing children

webcams and online video conferencing by different schools, so that they could share work locally, regionally, nationally and internationally and use these new technologies to empower themselves. Following this, came smaller types of mobile phones which were becoming mini computers, with the internet being shrunk down to fit onto smaller screens.

This revolutionary process was now allowing deaf children not only to phone someone with auditory support, but also

to text, email and send video messages, as well as having live mobile video chats. However, it was necessary to ask what impact this was having on deaf children's literacy and communication, as there was still a worry that a linguistic gap existed between deaf and hearing children. Over the years, research has indicated that 16-year-old deaf children have a reading/writing linguistic age of about nine years, which means that they are three to six years behind on the tests given to hearing children of the same age.

Looking to tomorrow...

It is, I feel, appropriate that this short introductory article on the changing technologies in deaf children's education should conclude with a project which strengthens the way deaf children and young people, as well as children with SEN, are embracing the different forms of technology that are making a difference to their lives. Indeed, new levels of independence, liberty and freedom are now being exerted by deaf children through the use of

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technology such as tablets, laptops and smartphones.

The Deafax project, The significance of ICT for the reading, writing and communication skills of deaf people, undertaken from 2006 to 2009 by myself and some deaf and hearing colleagues, was funded by the Leverhulme Trust. I am aware, of course, that since the project concluded, considerable progress has been made in terms of ICT equipment. Indeed, technology truly waits for no-one and the available devices seem to be changing by the minute.

The project aimed to obtain data about the impact of ICT from controlled experiments, interviews and group discussions with deaf children and young adults about their experiences in learning to read, write and communicate, as well as from seminars on these and related issues with teachers of the deaf. Contexts were also explored, notably past and current research in the US and elsewhere. The project approach included the use of British Ability Scales (BAS) and the Neale Analysis of Reading Ability (NARA tests) at nine-month intervals as baseline measures of general cognitive ability, reading (decoding) and reading comprehension. Other tests explored the impact of specific technologies and online deaf-friendly materials. Staff and local administrators helped in a difficult time with the recruitment of schools to take part in the research. Questionnaires were completed by deaf pupils and

teachers, and deaf teacher/researchers took part in some of the processes.

Pupils involved in the BAS and NARA tests were divided into three groups: (a) hearing impaired with special IT support programme; (b) hearing impaired without such a programme; (c) no hearing impairment and no special programme. Little or no reading improvement was found across the time scale in groups (b) and (c). Group (a), though, significantly improved their reading accuracy.

There are some constraints, however, on conclusions drawn from these tests: group sizes were relatively small, given the difficulties in recruiting participants. By the second round of tests some pupils had left (for example, to go to other schools), and groups were not ideally matched for age. Future studies would benefit from using smaller age ranges within groups, and levels of pupils' hearing difficulty should be estimated and used as controlling variables, since in the groups in this project the pupils' difficulties ranged from profound to mild hearing impairment.

Tests associated with other ICT programmes were the result of pupils being shown particular technologies or taking modules relating to ICT, and being tested at different points of time. Those who saw online materials and were tested for the European Computer Driving Licence (ECDL) achieved improved marks, but not sufficient to pass the ECDL. In all of these cases, the different strategies for exploring relationships between the use of ICT and deaf pupils' literacy and communication skills reflect the difficulty in the recent period of recruiting schools for the deaf or deaf units in mainstream schools for research purposes. The project counterbalanced this difficulty by adopting a multi-pronged approach, bringing together a range of insights into the use of ICT hardware and software by deaf pupils and teachers of the deaf, different kinds of tests, and seminars

New levels of independence are now being exerted by deaf children through the use of technology

on teaching reading and exploring visual literacy. There are important resulting pointers for development and future research, and I am already planning and taking initiatives, some collaboratively, that will benefit from this project and its outcomes.

Of course, the work to address the challenging issues of ensuring that deaf children get the very best support and improve their educational attainment must go on. We are busily setting up an initiative entitled the Virtual Learning Academy for Deaf and Disabled Children, working with Dr Vinton Cerf, who is Vice President and Chief Internet Evangelist at Google and recognised as one of the "fathers of the internet". As the name suggests, it is our intention to open this up not only to deaf children, but to children with a variety of SEN associated with speech, language and communication. The future, it seems, looks bright for those who embrace the changing technologies of the twenty-first century. **SEN**



Ken Carter enjoying communication with Deafax CEO Helen Lansdown.

Further information

Ken Carter is Director of the Deafax Innovation, Research and Development Unit and is based at the Institute of Education, University of Reading. As well as being a teacher/lecturer in deaf education, he was also an SEN advisory lecturer. He set up Deafax in 1985 as a charitable company providing practical support and access to innovative technology to the deaf community:
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