The technology revolution and deafness – a future book for all seasons

Ken Carter provides an overview of a book project still to be completed

Introduction

One of the most challenging projects that Ken Carter and Professor Harold Silver embarked upon was starting to write a book entitled 'The technology revolution and deafness'. Sadly, this book was never completed due to the deaths of Harold and his wife Pamela, but we did make lots of progress with a number of chapters, except for the final ones. Ken Carter is determined to publish a book and dedicate it to his outstanding mentor and friend and Harold's devoted and highly talented wife.

Pamela and Harold

This book would comprehensively study the possibilities and challenges facing the contribution of information and communications technology (ICT) to improving the literacy and communication skills of Deaf people. It would draw on 40 years of extensive experience of working with deaf children, young people, and adults, as well as with parents and teachers. It would also draw on a three-year research project entitled 'The significance of ICT for the reading, writing, and communication skills for deaf people', which would widely involve schools and the deaf community. The findings of this combination of direct experience and research would be important for deaf people, families and schools, and for education and policy making more widely related to people with disabilities. Although the ICT literature reviewed and commented on in this study revealed some significant contributions on the influences of word processing, electronic communication, multimedia authoring, video conferencing, and speech recognition, this book will indicate that there has been no direct previous research on the relationship between ICT and

Harold Silver

standards in deaf education, including writing and communication skills. The book will point out from the outcomes of this research and experience to the need and possibility of ensuring that teachers, parents, deaf children, and adults can embrace ICT as an educational tool to ensure that an interactive environment is created at home, school, and in the workplace.

Preface

It is planned to involve Dr Vinton Cerf (architect and inventor of the internet) and Sigrid Cerf, his wife, who is profoundly deaf but now wears a cochlear implant. Vint is the Honorary President of Deafax. He is widely known as one of the 'fathers of the internet', co-designing its protocols and architecture. He is Vice President and Chief Internet Evangelist for Google, contributing to global policy development and the continued spread of the internet. He has received numerous accolades and awards including the US Presidential Medal of Freedom, US National Medal of Technology, the Queen Elizabeth Prize for Engineering, the Charles Stark Draper Prize, and Officer of the Legion d'Honneur.v

Research backgrounds, historical contexts, and trends

The investigation, undertaken by Deafax ICT Research and Development Unit, also aims to consider the interaction between


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social environmental factors (ie increased motivation) and actual reading and writing behaviour. The study develops from a variety of initiatives taken by Deafax over 30 years or more to develop the use of ICT to improve the literacy and communication of deaf children, and some of these will be discussed in later chapters. One such project, begun in 1995, exploited the fax machine as a significant mode of communication between deaf children and 'fax buddies' who were hearing adults. The results of that project showed a clear improvement in deaf children's writing skills and motivation to communicate using writing (partly because of the fax machine's spontaneity), which had a dramatic uplifting impact on their skills. General conclusions from the data were difficult to make, however, since the study was not set up as a detailed experimental study. There was therefore no definite quantitative evidence of whether the children's reading, writing, and communication skills improved significantly over that which

Vint Cerf, Helen Lansdown, Sigrid Cerf and Ken Carter

could have been expected given the age and starting level of the children. The observational results could also not identify which aspect of the project (ie communicating with a new friend or the process of communicating by fax) had a positive impact. Other projects internationally in this period also showed similar problems of interpreting evidence.

Following a great deal of such developmental work, the study considered here was planned to use a more research-designed approach and to extend such research interests into a more comprehensive understanding of links between deaf people's learning to read and write, reading and writing age, social environments, and the increasing use of ICT. The methodology to be used is outlined below, but the core of the investigation was to be the impact of ICT on the writing skills of deaf children, comparing the written language skills of deaf children who had been using guided ICT for communication with a group of deaf children who had not been using guided ICT. The research was intended to develop an understanding of the learning difficulties and low achievement levels of deaf children (not only in the UK but also worldwide), and thus, to help deaf and hearing adults and organisations to improve the reading, writing, and communication skills of deaf people.

The research

The research outlined and discussed here, therefore, had starting points in the varied contexts described, including more than 30 years of Deafax experience and initiatives working with national and international communities of deaf children and adults, as well as with the families, schools, and the range of professionals involved with them. The research project was formulated with the basic aim of obtaining data from controlled experiments as well as from field research comprising interviews, group
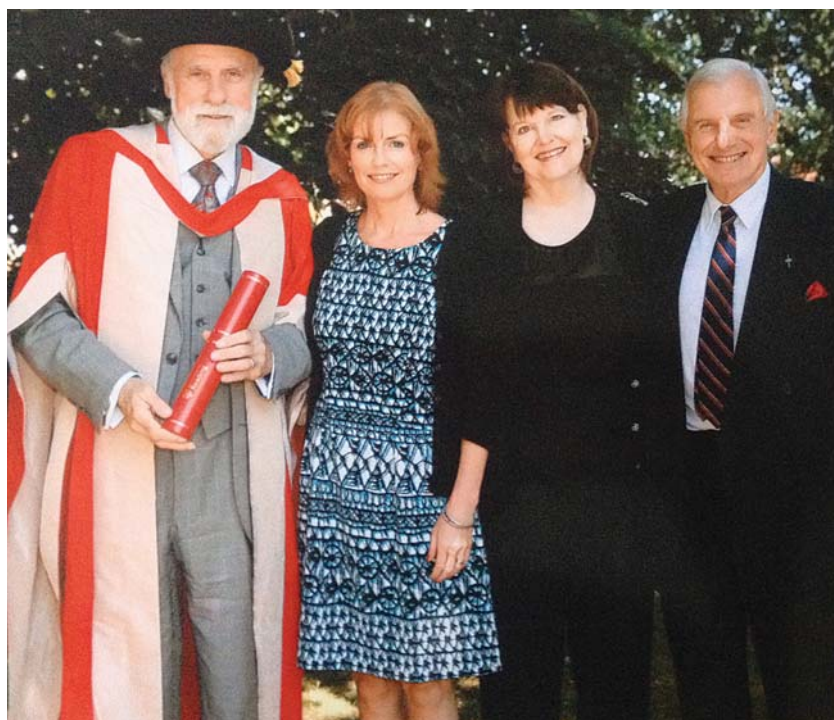
discussions and focus groups with deaf children and young deaf adults about their experiences in learning to read, write, and communicate, the extent and nature of the use of ICT in their various environments, and the factors affecting these processes and their outcomes. The research aimed to consider developments in the use of generally available or specialist technologies, attitudes of children, young people, and the relevant adult constituencies to technology-supported learning. It would indicate changes since surveys conducted in 2001–2 of 191 institutions by Deafax and sponsored by the then Department for Education and Science. Some directions for the research were suggested by the analysis of Conrad's 'The deaf school child' (1979) and by the establishment and rolling update of a bibliography of subsequent and recent historical and contemporary international research and publications, some account and implications of which will be contained in a later chapter.

To accomplish these aims a multi-pronged approach of 'sub-projects' was planned, including: a project involving a baseline phase with the administration of British Ability Scales (BAS) and the Neale Analysis of Reading Ability (NARA) at nine-month intervals; an 'Enhanced Learning through Technology' (ELTT) programme to ascertain whether specific technologies would make a significant difference to deaf pupils' reading, writing, and communication skills; and the use of online 'deaf-friendly' materials to enhance reading, writing, and computer skills of deaf/hard of hearing pupils through the European Computer Driving Licence (ECDL) programme. Other activities planned were to include focused seminars for Teachers of the Deaf (QToDs) relating to children's reading and writing; assessments of different kinds of software; questionnaires to and interviews with Teachers of the Deaf, hearing Postgraduate Certificate of Education (PGCE) students, and deaf pupils.

Quantitative research initiatives

Quantitative research and initiatives, including seminars, interviews, questionnaires, past, and present, regarding children's reading and visual literacy were activated. The intention of this section was to report in some detail on the Leverhulme 'non-research' initiatives, which incorporated exploring initiatives, shown below.

Early reading

The main recommendations of the Rose Report 2006 on 'Early Reading' concluded the following: that the process of learning to read is very complex; talk precedes and underpins development; far more systematic teaching of phonics is needed; to create a rich language classroom experience; and learning should be creative, multi-sensory, imaginative, and interactive.

Teaching reading

With the above conclusions in mind, two seminars attended by Teachers of the Deaf were organised with reports produced, to explore, challenge, and question the teaching of reading to deaf and hearing children. 'What do you mean by reading?' 'What happens when we read?' 'Were we educated to understand?' This leads onto questioning the differences between deaf and hearing children's reading abilities and strategies, and the understanding of the literal meaning of the text, which involves the following: picturing in the mind, questioning, re-evaluating, inferring, predicting, anticipating, commenting, using personal experience, and using inter-textual knowledge. There was a general consensus that supportive visual text can enable deaf children to make meaning from a text.

Visual literacy

The following was explored in some detail: visual experiences, especially the construction of internal image

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when reading, are common and visual intelligence is recognised, and catered for, within multi-sensory approaches to teaching, but neither drawing nor reading pictures hold much status in schools outside the art curriculum. As with print literacy, visual literacy involves making meaning either by interpretation (reading) or through the creation (representation). Children, including deaf children, would appear to need experience of both as a means of establishing cognition when encountering new ideas.

Visual communication

Visual communication through the advent of the internet, telephony/telecommunications, etc is changing the way we all communicate with one another. Deaf people, through our research programmes, are starting to embrace different kinds of technologies: more sign language and subtitling, which seem to be improving their literacy, language, and communication skills.

Interviews

The following questions were used to explore how deaf and hearing people viewed visual literacy:

- How important is visual literacy and ICT in educating deaf people?
- How important do you think visual literacy and visual communication is in terms of learning styles/needs of deaf people?
- Do you think that teachers/schools are using visual literacy strategies enough?
- How can virtual learning be delivered at home/school?

Please make reference to the following:

- Use of software/hardware and other resources; strategies that Deafax has used/finds useful?
- Outline specific software that you find useful for developing the reading/writing abilities of deaf pupils, and give a brief summary of this software and explain how it helps to support deaf pupils?
- Outline any other software that you would recommend for any other curriculum areas when educating the deaf.
- How valuable do you think that picture books are for deaf readers?
- Would you recommend any particular writers/illustrators?
- To what extent do you think that ICT technology has helped deaf children in terms of visual literacy and integrating with people in the classroom/community?
- How do you think that visual literacy can be used for the teaching of early reading/writing?
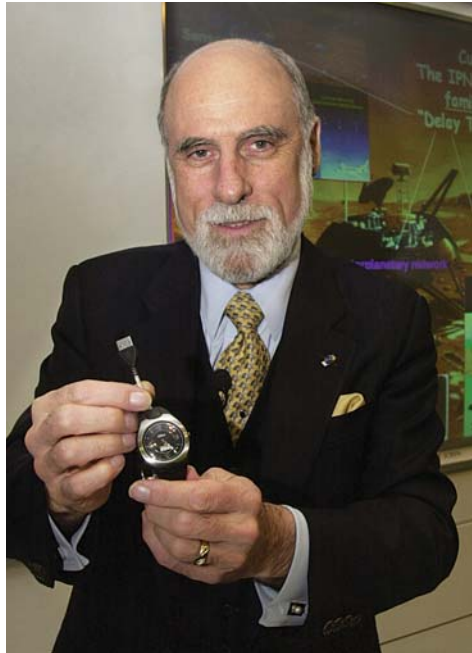
Questionnaires – deaf children

Thirty-five questionnaires were returned, either in hardcopy or electronically: 55% were boys and 45% were girls; ages ranged from 8 to 14

years, and the majority were severely to profoundly deaf. The overall impression of the questionnaires was that the pupils were very familiar and confident with the equipment they were using at school and there had been an improvement in terms of use and access at home. The pupils, who spent four hours per day using equipment at school and home appeared to be more confident and attainment was higher than those who only used the equipment for a small amount of time at school. Computer-type games seem to be important in getting some deaf pupils to communicate and to use other types of ICT equipment. There needs to be more opportunities for deaf pupils to use ICT to communicate with hearing pupils and adults. ICT needs to be introduced into the whole of the curriculum. Specific software packages that have been reviewed in this study to support more flexible learning need to be introduced as soon as possible. More ICT training for deaf children would open up greater use of websites and especially DeafKidz International. The pupils' understanding of how to improve their reading, writing, and communication skills through different kinds of ICT equipment needs to be explained by their teachers and parents as well as by Deaf mentors.

Questionnaires – Teachers of the Deaf

Twenty questionnaires were returned, either in hardcopy or electronically: 60% were from primary schools for the deaf/hearing support units and 40% were from secondary aged pupils. They were responsible for about 276 pupils with moderate, severe, and profound deafness. The modes of communication of their pupils ranged from oral, British Sign Language (BSL), bilingual, signed English, sign supported English and total communication.

The teachers have helped to identify some important areas that need to be addressed for future ICT planning and provision in order to improve standards for deaf pupils relating to their reading, writing, and communication skills.

The following needs to be considered:

- introduce webcams to all Schools for the Deaf and Hearing Support Units so that internet video conferencing can be used to enhance communication at a distance. This would enable far more learning and teaching to take place locally, regionally, nationally, and internationally; schools for the deaf/hearing support units to organise far more ICT training sessions for Teachers of the Deaf to keep them up to date with advances in hardware/software educational technology;
- Teachers of the Deaf, parents, and deaf mentors need to become more skilled in their understanding of how

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specific ICT hardware and software can improve their pupils/children's reading, writing, and communication skills.

A perspective on visual literacy and ICT for deaf pupils

More international coverage of themes covered above, and related aspects.

The following questions were asked by Louise Mann (4th Year BEd, University of Reading) to Ken Carter (Founder of Deafax/Director of Research) on 24th February 2009.

How important is visual literacy and ICT in educating deaf people?

The development of literacy in deaf pupils is frequently delayed, and attention is often drawn to their difficulties in progressing to beyond a reading age of eight or nine years. Deafax research findings indicate that a high proportion of the deaf population continues to experience difficulties with reading and writing throughout their lives, due mainly to a more phonic approach related to hearing aids and auditory training. Such a population is diverse with widely differing degrees of deafness, intelligence, skills in using their residual hearing, lipreading, sign language, and signed speech. The complexities surrounding the acquisition of language and the ability to read and write by deaf children, young people, and adults cannot be underestimated and pose an enormous challenge. Visual Literacy is starting to be used in an ICT multimedia way for all learners and therefore is making an important impact on the education of deaf pupils, whether in an integrated or segregated environment.

How important do you think visual literacy and visual communication is in terms of learning styles/needs of deaf people?

Visual experiences, especially the construction of internal images when reading, are common, and visual intelligence is recognised and catered for within multi-sensory approaches to teaching, but neither drawing nor reading pictures hold much status in schools outside the art curriculum. As with print literacy, visual literacy involves making meaning either by interpretation (reading) or through the creation (representation). Children, including deaf ones, would appear to need experience of both as a means of establishing cognition when encountering new ideas.

Visual communication through the advent of the internet, telephony/telecommunications, etc is changing the way we all communicate with one another. Deaf people are starting to embrace different kinds of technologies through more sign language and subtitling, which will over a period of time improve their literacy, language, and communication skills.

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Do you think that teachers/schools are using visual/literacy [V/L] strategies enough? How can V/L strategies be delivered at home/school?

Please make reference to the following:

– use of software/hardware and other resources

– strategies that Deafax has used/finds useful.

From Deafax's research outcomes, we think an increasing number of deaf schools, hearing support services and peripatetic services are embracing different types of strategies to introduce more 'visual literacy' into their respective curricula. However, where the first language is BSL, children tend to write English using BSL grammatical structure. It is clear how their first language, which has no written form, influences the development of their English literacy. Many deaf children, not just those whose first language is BSL, find difficulty in using tenses, conjunctions, prepositions, and many other features of English grammar. The reason for this is, in part, because many features of English are not present in BSL. As deaf children do not hear all spoken English, even with hearing aids, the reinforcement is not present and acquisition is delayed. Greater visual stimulus is required to reinforce English grammatical features. Deafax did embark on a 'Home Access Programme' in conjunction with British Educational Communications and Technology (BECTa) and others, as part of a drive to develop more synergy between school and home in improving levels of literacy, numeracy, and communication skills.

Please outline specific software that you find useful for developing the reading/writing abilities of deaf pupils. Please give a brief summary of this software and explain how it helps to support deaf pupils. Modern computers can be great motivators and also provide the process of revising and editing. Software that provides visual representations, graphics and colour etc is very important in the education of deaf children.

How valuable do you think that picture books are for deaf readers? Would you recommend any particular writers/illustrators?

Pictures in books are often dismissed as purely decorative or as something to be abandoned by readers as skills in understanding print increase. Such opinions fail to take into account that pictures, like words, express meanings that need to be interpreted if they are to be understood. Picture books that have no written text, for example, far from being easy to comprehend can be very challenging to readers of all ages and experiences. Learning to look closely – beyond and between the line, shape, colour, and space in a picture is an essential aspect of reading visual texts, just as reading beyond the literal is essential when reading print. Good picture books require deaf children to look closely, talk (communicate) about and interpret images, and enhance their skills as critical readers.

To what extent do you think that ICT technology has helped deaf children in terms of visual literacy and integrating with people in the classroom/community?

Deafax has considerable experience in tackling large projects in the fields of deafness and education and is uniquely qualified amongst deaf organisations in the UK to comment on its use of ICT as an aid to deaf children's learning and visual literacy.

How do you think that visual literacy can be used for the teaching of early reading/writing?

It would seem sensible in the light of present evidence for educators of deaf children, including parents and deaf adults, to focus on the following in relation to acquiring better reading and writing skills:

Drawing to infer meaning – Drawing has long been recognised and valued as part of "the pre-history of written language" (Vygotsky, 1978) and more recent research has reinforced and developed this knowledge (Dyson, 1989; Kress, 1997; Styles & Bearne, 2003). However, Barrs (1988), whilst fully acknowledging the evolutionary path from drawing to writing, makes the point that when expressing meaning on paper, drawing is sometimes a far better means of representation than print. The use of faxes, scanning, and attachments by email and other ways of sending drawings electronically needs to be introduced.

Drawing to express response and understanding – Drawing in response to a story or poem, either spoken or signed, is sometimes perceived as an 'easy' way to get children to express their ideas, but such a description is undeserved. Offering children, including deaf children, the chance to draw in response to what they have read or have had read to them, provides a context that can reveal the depth of their understanding more accurately than written language.

Art as inspiration for writing – Writing can engender an artistic response and equally, art work can inspire a written response. Work on 'Tell me a picture'. An important part of this experience will be to validate deaf children's interpretation and imaginative responses of each painting.

The influence of the moving Image – Multimedia texts need to be used to see how deaf children's reading and writing skills can be improved. Computers, television and films now play an important role in developing our visual imagery.

How does Deafax seek to remove the barriers in deaf children's learning?

What do you think you achieve through your training days and your choice of software/modules?

Deafax has built up over 30 years, since it was first set up, a number of ways to remove barriers in deaf children's learning. It has:

- introduced new technologies that were stimulating and challenging
- produced relevant modules that could be adapted to meet individual needs
- trained and employed teams of deaf and hearing people
- promoted deaf people as role models
- kept apace of the state of the art in terms of relevant technologies
- trained Teachers of the Deaf and parents locally, regionally, and nationally
- broken down communication barriers

the list goes on...

Training days have taken us to all parts of the world both face to face and through internet video conferencing. We have chosen our materials carefully so as to meet the needs of our learners. Feedback/evaluation have enabled us to get the maximum benefit to all concerned and revise our ICT learning programmes accordingly.

How fundamental is visual literacy overall in terms of life skills? Where are we now?

From a Deafax perspective, we want to promote the importance of visual literacy and exploit and participate in this 21st Century ICT revolution for the benefit of deaf children, young people, and adults. Our mission has been, since its inception, to lead by example and identify, promote, and implement solutions that enable deaf children to become computer literate and effective readers, writers, and communicators. We know that faxes, text phones, mobile phones, emails, the worldwide web, and the internet are changing the way deaf children communicate. It is now important to explore how visual literacy and technologies can make a significant difference to the life skills of deaf children.

Review and evaluation of software for deaf children

Lots of software has been assessed of ongoing ICT training and awareness which applied to Teachers of the Deaf, parents, and support workers.

Fourteen text terminals were used to train and educate deaf children and their families to help improve the children's integration and levels of literacy. Four deaf adults were involved and the outcomes were very positive, with the children keeping in touch with one another without the parents being directly involved. The children became more independent, and improved text/literacy communication became a feature of this project.

In 1998 it was evident there was ever-mounting pressure from the British government to increase ICT provision in schools. The Stevenson Report (1997), ICT in UK Schools, Excellence in Schools, Connecting the Learning Society, National Grid for Learning, Excellence for All Children, and the New Opportunities Fund (NOF)/Teacher Training Agency (TTA) initiatives were all produced to highlight and demonstrate this commitment of the UK education system to embrace the technological advances taking place in other countries. We did not want to be left behind in this global resolution.

During this time, the Department for Education and Employment (DfEE) Special Educational Needs Division was attempting to develop a National Strategy on ICT for Deaf Education. Deafax, therefore, took the lead, and out of the Telecommunications and Literacy Programme, which was a national education and training one, emerged Deafchild UK, which was made up of BT, BATOD, Friends for Young Deaf People (FYD), Royal School for the Deaf Derby, College of Teachers, National Network of Deaf Students (NNDS), European Bureau of Deaf Students (EBDS), Dyslexic Institute, Shaftesbury Society, Thames Valley University, University of Reading, and Childnet International, plus a number of deaf and hearing people not affiliated to specific organisations.

It is the intention of Ken Carter and other research colleagues to complete and update this book by addressing all the sections mentioned in this article and the following sections:

▶ Present and future Technologies – Online Meetings and Google Speech to Text Technology

▶ Outcomes, conclusions, and implications.

Ken Carter is a former Lecturer/Teacher of the Deaf and is now involved in nine educational and technological enterprises

Links

METEC – Deafax (www.deafax.org)

AACT– (www.aact.org.uk)

Decibels (www.decibels.org.uk)

Ability2Access (www.ability2access.org.uk)

Specialkidz (www.specialkidz.org)

Deaf Aspirations (www.deafaspirations.org)

EASiTEC (www.easitec.co)

Deaf Sports Football Foundation (www.deaf sports football foundation.org)

GOALS4LIFE (Global Online Assisted Learning and Support) (www.goals4life.org.uk)

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