

...IT disability & LIFELONG LEARNING...



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preface

Education does not stop when pupils leave full-time education at 16. Indeed, evidence from basic skills classes in colleges suggests that for some learners, leaving school is the moment when education starts. Pupils who have lacked motivation can turn into adults who are keen to improve their skills.

Lifelong learning is a goal for every individual and should be a goal for society. Patterns of employment have changed in recent decades and few people now stay in the same job – or even the same industry – for the whole of their working lives. No one can predict accurately the skills and knowledge which will be essential for tomorrow's workforce. Thus, in order to take advantage of the training available, people need to learn how to learn.

In the past, people with disabilities, learning difficulties or serious literacy problems were debarred from many professions. Those with severe learning difficulties were seen as 'ineducable' and those with visual impairments were limited to a very narrow range of careers. Now, with changing attitudes and the advent of increasingly powerful technologies,

the range of work opportunities has expanded. Videotelephony means that deaf people who use British Sign Language as their primary means of communication can talk to one another; the blind can give and receive information in Braille, print or in spoken form, while the physically disabled can access standard packages using the same computers as everyone else.

The technology is already here but there exists an information gap. Teachers, lecturers, advisers, employers and policy-makers need to be well informed about the technology – not only what is available now, but also what is just over the horizon. Today we have word processors, graphics and spreadsheets as standard applications; tomorrow, voice input systems and Virtual Reality will be commonplace. Let us make sure that the learners of tomorrow are enabled to access and benefit from the power of technology.

Sally McKeown

NCET, January 1996



originals of cover image and hand motifs created by Nicola Wainde and Lucy Arthur of Kaleidoscope (NSF), Nuneaton, as part of NCET's Motivation Project, 1996



access to words

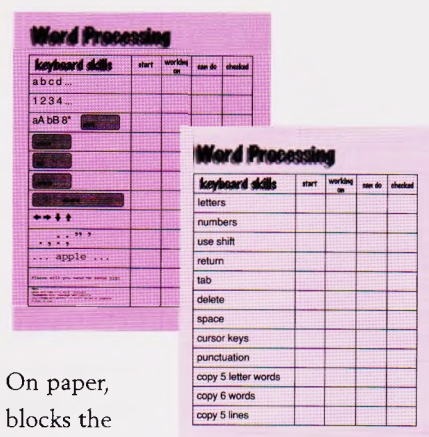
For many people, adults and children alike, putting words on paper can be a frightening experience – it exposes their poor spelling, ignorance of grammar or irregular handwriting. Yet we all need to communicate through writing, be it a thank you letter, a note for the milkman, an essay, a CV outlining work experience, or a business report.

For anyone who has dyslexia or poor handwriting, a word processor offers liberation. It will check spellings and enable a perfect print-out every time. It also encourages a more structured approach to writing by enabling users to extend and refine their first thoughts.

A word processor also encourages writers to continue a train of thought. On paper, hesitancy over a particular word often blocks the thought process or stops it altogether, whereas working on screen, the user can pursue the flow of ideas, leave a gap and return to fill it later.

Predictive word processors offer valuable support to learners for whom every word is achieved with difficulty: they offer a selection of likely words to follow what has been typed already so the user selects the most appropriate with a single key-press. The more sophisticated programs not only allow the user to add personal words to the list, they also become individualised to the user.

Spelling checkers may be useful to even the most competent speller. To a hesitant speller they can



...The Access to Learning Project, in which ten colleges were involved, found that IT not only raised the confidence and self-esteem of the students, it also enabled them to achieve higher units of competence than expected. For some of the students involved, IT gave them their first opportunity to write for themselves, using standard or overlay keyboards and template software such as ClarisWorks.

...Cloze exercises produced with programs such as Developing Tray are a useful way of supporting emergent writers, and one which can be carried out very effectively as a group activity

MY C*^R

L*st s*mm*r * fr*nd g*v* m* * bl*ck
 *scort M*rk 2 c*r w*th t*x *nd M*T *n *t.
 *ne d*y *t 12 *cl*ck * w*s dr*v*ng th
 c*r. Th*r* w*s * c*t *n th r*d.
 * m*ss*d th c*t *nd h*t * br*ck w*ll.
 Th* c*r w*s sm*sh*d *p. * w*sn't h*rt.



be invaluable: in an advanced word processor, if the user keys in the letters he or she is sure of, the checker may offer the correct word. Access to a word processor is not always possible, however, and a hand-held spelling checker is as useful for students as they move from classroom to classroom as for adults in the workplace. The Franklin Wordmaster, for example, is only the size of a credit card, yet it contains 83,000 words. It allows users to key in question marks in place of doubtful letters and has a thesaurus facility so that 'confusables' can be cross-checked.

Speech synthesis offers further support, particularly if the user confuses common words or letters – if the computer speaks the word aloud, the user can tell instantly whether the word is right.

Peter works for a training agency, specialising in outdoor education. For many years he managed by dictating all his letters to a secretary, but when he started work on a large-scale funding proposal, this was no longer feasible. He started to use Co:Writer, which predicts words on the basis of the first few letters he types. It understands subject-verb agreement, usage and frequency, so its suggestions are sensible. Recently Peter added Write: Outloud, a talking word processor. Co:Writer predicts the text and Write: Outloud reads it back to him so he can check that his choice is correct.

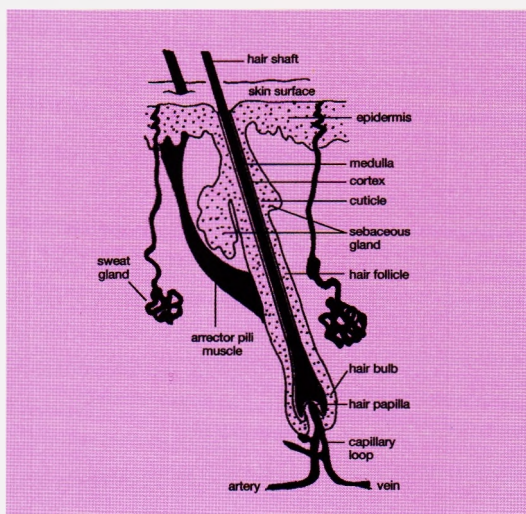
Software planning tools can also be helpful for writers who are hesitant or disorganised. Thinksheet, for example, is like an electronic notepad on which the user jots down on 'cards' headings and ideas. Up to 1,470 cards can be rearranged and extra ideas added on different

levels and the resulting text can be exported to a word processor.

For very young readers or those with moderate learning difficulties, multimedia provides an opportunity to create whole stories. They may start with a few short sentences and add pictures they have drawn or scanned in – or start with the illustrations and write captions instead. Sound-clips can be added too, to make a talking book for themselves and others.



CD-ROM discs, increasingly common in all phases of education, offer a range of support in literacy. Finding the right reference book in a library can be hard enough, and finding and recording relevant information from it even harder. Using a CD-ROM encyclopaedia can help to overcome this: searching by key word should produce a number of pieces of information which can be browsed and downloaded to print (with pictures too), saving hours of copying out or taking notes. With sound, video and animations in addition to words, CD-ROMs are particularly effective in motivating reluctant readers.



...Some tutors are using multimedia to develop talking worksheets. Using photographs and video clips with spoken messages, students can find out about health and safety hazards, kitchen hygiene or science for hairdressing.



access to numbers

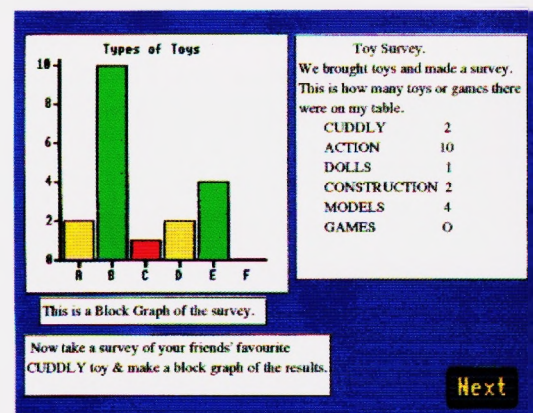
Very few of us are able to do complex mathematical calculations in our heads and luckily, few of us need to. The calculator is one of the most useful tools of information technology in daily use and yet it is often taken for granted.

Research shows that if young children regularly use calculators, their concept of place value is improved and they learn to handle 'large' numbers much sooner than might be expected. Calculators can help learners with disabilities, too, particularly if they have problems with writing numbers down in the correct order; a talking calculator provides both visual and auditory prompts and it becomes clear immediately if the user has keyed in 379 instead of 739.

A student in an adult basic education unit, Melanie wrote numbers like 304 when she should have been writing 34. She was simply writing the 'thirty' and then adding the four to it. A talking calculator revealed mistakes of this kind and, after she had used it for some time, she found she could manage without.

For young learners or those with severe disabilities, part of the problem with maths is its abstract nature. Working with small numbers – particularly if they are represented by concrete objects – may be achievable, but moving to abstract symbols is more complicated. Computers can help here, with a variety of maths programs which use graphic representation to support the concepts. The use of bar or pie charts, for example, helps to reinforce concepts of proportion.

... The class was carrying out a survey of the kinds of toys which were popular. Having collected all the data, it was decided to put it into a presentation package. This allowed all the pupils to enter their data and contribute to the findings. The data was then converted into a block graph which showed at a glance the relative popularity of different types of toys.



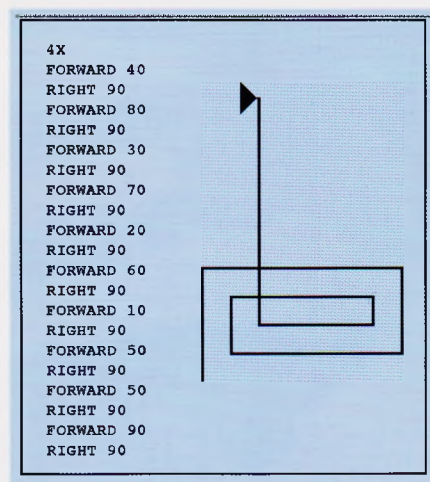


...Calculators may be taken for granted now, but they too use IT

Logo can also be used to help learners develop concepts of right, left, angle of turn and distance. Developmentally young learners gain more from using a floor turtle which they can direct – with or without success, but certainly with fun – around a maze built on the floor. A turtle also provides good practice in estimating both angles of

turn and distance, and gives learners an unusual opportunity to estimate large numbers in the number of turtle 'steps' it might take to cross a large hall, for example. If you don't have access to a floor turtle, learners themselves can act as the turtle, taking directions from each other in negotiating their way around.

For learners who are able to handle relatively abstract concepts, screen turtles offer a more sophisticated opportunity to investigate number patterns.



Shopping	Prices	Money
		£ 12.00
Margarine	0.45	£ 0.45
Cheese	0.92	£ 0.92
Bread	0.74	£ 0.74
Sausages	0.84	£ 0.84
Menu Master	2.45	£ 2.45
Chips	1.25	£ 1.20
Baked beans	0.35	£ 0.35
Peas	0.48	£ 0.48
Bananas	0.35	£ 0.35
Yoghurt	0.62	£ 0.62
Toothpaste	0.75	£ 0.75
Shandy	1.2	£ 1.20
Milk	0.64	£ 0.64
Cost	£ 11.04	
Change		0.96

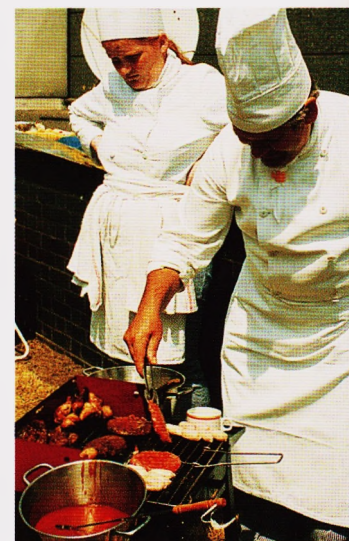
Spreadsheets, whilst being sophisticated tools for mathematical modelling, can also provide help for much lowlier activities. Calculating quantities and costs for shopping or cooking are vital life skills and ones which present considerable difficulties for some students. A simple spreadsheet like the one on the left, which adds the cost of all the items listed and then subtracts them from the money available, can provide support. If the

shopping list exceeds the funds, it is relatively easy to see the effect of not buying a certain item after all, and far easier than attempting handwritten sums or using a calculator.

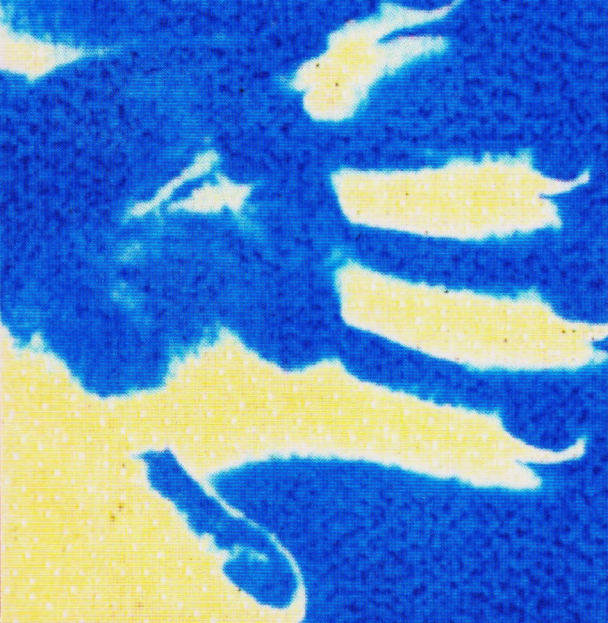
BARBECUE PLAN		
Number of people		20
Item	Price to pay	Cost per person
20 beefburgers	2.49	0.12
3 lettuces	1.02	0.05
2 cucumbers	0.78	0.04
3 lbs tomatoes	1.35	0.07
2 lbs onions	0.36	0.02
36 sausages	2.59	0.13
36 rolls	2.44	0.12
2 x 3 litre Cola	1.58	0.08
2 x 3 litre lemonade	1.48	0.07
Grissini	1.12	0.05
Dip 1	1.92	0.1
Dip 2	1.92	0.1
Ketchup	0.69	0.03
Total cost	£ 22.73	
Cost per person		£ 1.13
Cost per person is price to pay divided by number of people		

Each year, the FE unit at St John's School in Bedfordshire plans a barbecue. Having chosen the items they want to eat and drink, they then carry out a costing exercise, to see how much they will need to charge.

We expected between 18 and 24 people and so it became clear how useful a spreadsheet would be to 'predict' a likely cost per person. We entered all the items we wanted and went to our nearest supermarket to price the items. This data was added and also a third column which contained a formula for dividing the costs between a set number of guests. We could now enter and delete specific food items to reach our budget of £1.00 per person, or change our budget target to £1.50 if we wanted to include gateaux or more dips.



...Numbers become much more meaningful when they relate to a real activity – costing the food needed for a barbecue, for example



overcoming visual impairment

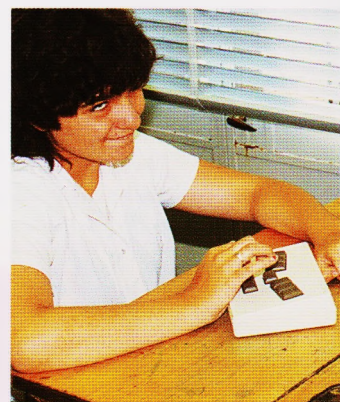
There are estimated to be more than three quarters of a million blind or partially sighted people in Britain. For the overwhelming majority, their visual impairment increased over a period of years, and for many of these, reading materials may still be accessible provided the print size is large and clear enough – 14 points or larger, for example.

IT offers a number of forms of support to those who have a measure of residual vision. The first is the ability to enlarge text on screen and to alter colours to suit the individual user – these two features alone can provide access for a large number of visually impaired learners. Those who have severe impairment may benefit from specialised software – Lunar, for example – which displays text on screen in a range of magnifications.

But what about printed material that is not available on computer? One solution for educational settings is to use a scanner or a closed-circuit television to capture pages of text so that they can be magnified on screen. If the computer is also fitted with speech output, then even totally blind users are able to access all printed material.

Ceri, aged nine, is a bright, sociable pupil who is totally blind. She attends her local primary school and has help from a support teacher for the visually impaired plus weekly visits from the mobility officer and typing teacher. Her needs have been stated and as a result, she was provided with a computer, speech synthesiser and overlay keyboard. She reads Braille and has a Braille'n'Print system so she can produce written work which can be read both by teachers and her fellow pupils. Brailled books are supplied but as she gets older she will need access to a wider range. In the meantime, she uses a scanner to copy text which the computer then reads out to her. Extra equipment such as talking thermometers and scales are regarded as essential in providing access to the full curriculum.

.....



... Braille machines can offer a lifeline to the totally blind but text can only be read by Braille readers; if users can use a computer keyboard, their text can be read by the sighted as well

What if you don't know which book to look at? CD-ROM technology is making a wide range of reference material and information available on disc, including pictures and sound and video clips. The fast search facilities of CD-ROM are particularly helpful for the visually impaired, who can now use encyclopaedias to find out the information they need along with their sighted peers.

As the popularity of CD-ROMs increases, the range of titles is growing. Newspapers and encyclopaedias have been available on CD-ROM for some time and set texts such as the works of Shakespeare or Jane Austen are proving useful to students and researchers alike. CD-ROM also offers entertainment to learners, with its inclusion of sound and video and the possibility of interactivity by pressing screen buttons to make

sounds or produce additional information.

Suzanne is happily settled at her primary school despite her severe

visual impairment. She can see a computer screen by putting her face very close to it and can read printed material if it is enlarged sufficiently. She faced two problems, however: one was of finding material which motivated her and the other was finding activities which she could share – when your nose is against the paper, it tends to prevent others from sharing it with you.

Arthur's Teacher Trouble, a CD-ROM disc, provided a solution to both difficulties. Each 'page' has several different animations which are triggered by pressing parts of the screen, and this motivated Suzanne to learn to navigate with the mouse. This disc also features a paper dart which users have to find hidden somewhere on each page. The absolute joy each time the dart was found was wonderful to see. Suzanne has never been so motivated. The mixture of sound and animation, but above all the interactive nature of the program, has given a new dimension to her learning.



...CD-ROM technology is proving very useful to the visually impaired. Catherine is blind and integrated in a Year 8 mainstream class. Her class was doing a project on Brazil, and Catherine chose to look up information for herself. In the resource room she switched on her portable PC and, with the help of its Braille label, located the *Information Finder* CD-ROM. She found an article on Brazil and was able to begin listening within a few minutes of sitting down at the computer. She spent some time listening to the first page of the article and then began to make notes on her portable. She listened to a few lines at a time and then made notes, in a similar way to a sighted child reading a textbook and making notes on paper.

Braille has long been used as a tactile medium for reading, but it is slow, bulky compared with printed books, and only a limited range of books are available in this format. For some visually impaired learners, however, it is a useful method of producing written work and when combined with IT, a powerful means of communication.

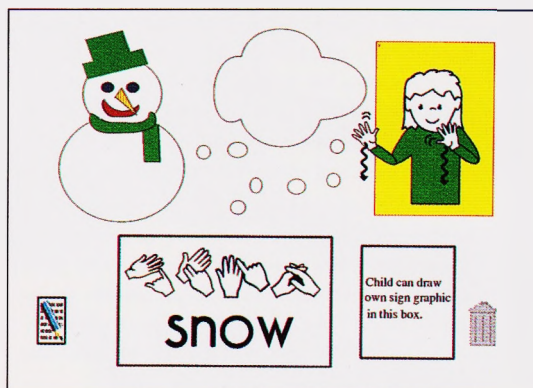
Howard is blind and taking a business studies course at his local FE college. He needs to improve his vocabulary, so whenever he hears a word he doesn't understand, he makes a note of it on his Eureka (a portable computer with a Braille keyboard and speech output). When he has a free period, he goes to the Open Learning centre and looks up the words using the *Information Finder* disc.

In the past, visually impaired and blind learners were taught to use typewriters so they could communicate with others in writing. Nowadays, word processors offer the same facility, but more besides. Portable computers – ranging from small palmtop models to sophisticated laptops – are making IT more accessible for all users, and offer the visually impaired the opportunity to make notes wherever they are.

The speech facility of many computers is particularly useful, as it enables users to check that spellings are correct before their text is printed out. Talking calculators, scales and thermometers are also available, which enable visually impaired learners to work independently across the full range of curriculum subjects.

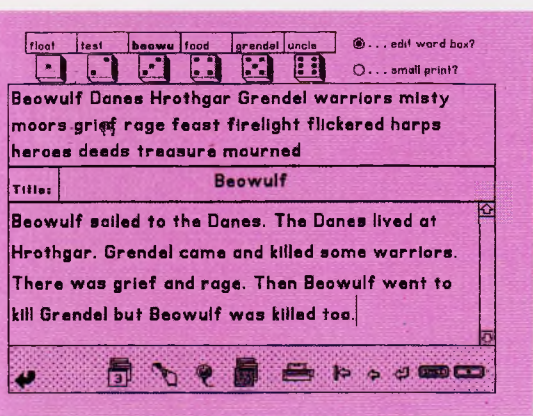
...A portable computer can be used anywhere for note-taking, displaying large text which can then be printed out





...Sign Graphics bridges the gap between sign language and the written word

...Using the *Encarta* CD-ROM enabled a hearing-impaired student to find out about her favourite tennis player and write this piece



...Expand It promotes structured sentence-building by supplying keywords and inviting users to link them together

Sign language has long been used as a versatile medium of speech, but its chief drawback is that its use is limited to the hearing impaired and their helpers. At some stage, learners need to convert to the spoken

and written word, and programs such as Sign Graphics offer a helpful bridge between the two.

A number of other pieces of software help hearing-impaired students to develop specific skills. HyperWrite, for example, a suite of programs created for use with HyperCard on Apple computers, provides structured support work which can use the learner's own language. Jumble It jumbles up the words in a sentence so that users have to rebuild it and thus encourages them to think about all the 'little' words such as articles which are often missed out by those whose first language is signing. Similarly, Arrange It rearranges text entered by the teacher – a set of instructions for example – so that users have to reconstruct the sequence.

The ability of computers to speak and even animate text has opened up a new world to the hearing impaired. The CD-ROM disc, *My first incredible, Amazing Dictionary*, for example, has one thousand words illustrated with



Hello!

Real Life Martina Navratilova

Martina Navratilova was born in October 1956. She lived in Czechoslovakia until she was 21, now she lives in America. She has always said she was born to be an American. America is very different from Czechoslovakia.

At 16, she became the Czechoslovakia National Champion and now she could play in International Championships. After that, she won 6 Grand Slam Championships, one after the other. These include:

- Wimbledon
- The US Open
- The French Open
- The Australian Open

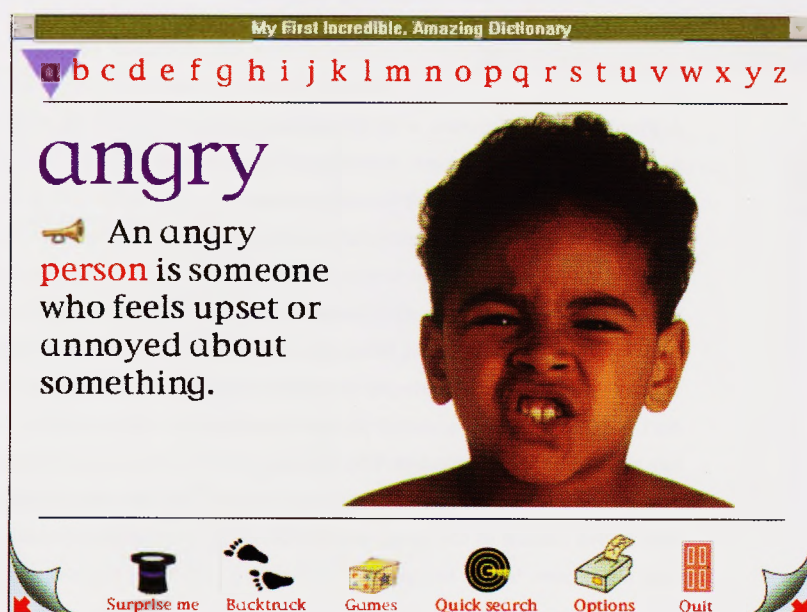
She went on to win these championships again and again.

Wimbledon is very important to her. She has played there 21 times, winning singles 9 times.

Her ambition is to win singles 10 times at Wimbledon and be able to play when she is 40 and to play doubles in the Olympic Games in 1996.

sound, pictures and animation. Clicking on words enables the user to hear the word spoken, note its pronunciation, see how it is spelt and read its meaning. For the hearing impaired to make best use of speech on computers, however, care must be taken in choosing a good sound system or high-quality headphones with volume control.

Work is continuing on ways of exploiting the ability of multimedia to combine video of say,



overcoming hearing impairment

sign language, with spoken words and written text. If you know the sign for *horse*, for example, it would be very useful to use a CD-ROM dictionary of signs to find, speedily, how it is spelt and to check that your understanding of the word is correct.

CD-ROM simulations or adventures also give young hearing-impaired learners a special opportunity to work collaboratively. Adventure CD-ROMs such as *Myst*, where choices the users make will affect the outcome, encourage them to communicate their ideas and debate the best way forward. They can also be useful in expanding vocabulary beyond the everyday level – particularly valuable for hearing-impaired learners who may use and experience minimal vocabulary.

Using CD-ROMs also helps the hearing-impaired learner to become autonomous, by developing skills in scanning, skimming text and learning to relate pieces of knowledge to one another.

Video is opening up a number of avenues of communication

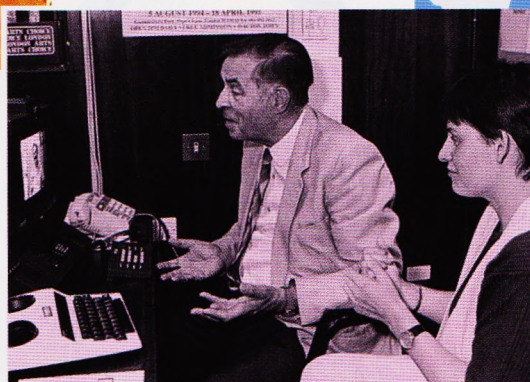
to the hearing impaired. Video translation is a service offered to some deaf students in further education, in which communication support workers gather information needed by the students and translate it into sign language on video; the students take the video home and make notes based on the information contained.



... Videocaption readers provide on-screen subtitles – particularly useful for cartoons, where lip-reading is impossible

... Minicomms allow the deaf to communicate by telephone, by converting speech to a text display

... Videophones enable deaf users to communicate remotely with each other: they are filmed signing their messages and the images are passed down ISDN telephone lines



Many of those who are born deaf may experience delayed language skills and a diminished knowledge of English vocabulary and grammar. Fortunately, IT can offer support in a number of ways.

coping with physical impairment

It is in the area of physical disability that IT offers most dramatic support. Switches and devices offer those with severe physical disabilities more and more control over their environment. A single switch – operated by minimal movement of a finger or the head, perhaps – can give its user access to a wide range of computer-controlled systems of communication.

Typing on a standard keyboard may be appropriate for many users, but for some, their lack of fine control means that aiming at a single key is difficult. A keyguard helps here as it prevents the user from striking more than one key at a time; in the same way, a specially designed wrist or arm rest may help to focus movement. Some physically disabled users find a mouse or trackerball simpler to control, however, and use these in preference to a keyboard.

For those learners who find any major hand movement difficult, switch access is the answer: a range of options (an emulation of the keyboard, for example) appear on the computer screen and the user can manipulate a switch or joystick to make his or her selection.

... A touch-screen enables users to interact directly with the computer



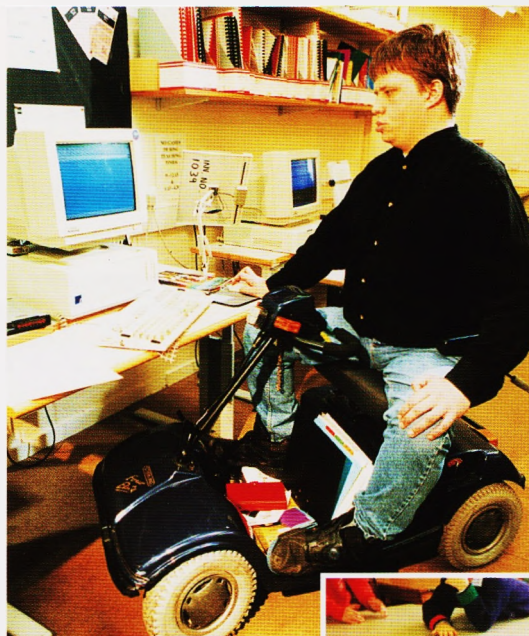
... Anisa uses a laptop to record phone messages which would not be legible if written by hand

Overlay keyboards are another useful device and one which can be adapted to suit both the physical and developmental ability of the user. Words, pictures, symbols or actual objects can be placed on an overlay and by pressing any of these, the user can make the appropriate words appear on the screen; messages can also spoken aloud by the computer or be printed out so that a written record is available.

Speech input is another area which enables the most severely disabled user to access information technology. At its simplest, the volume or pitch of the user's voice may be used to activate switches. More sophisticated systems are in development which can be trained to recognise the user's voice and act upon instructions; whilst these systems offer great potential, as yet voice recognition requires the user to pronounce words consistently and training the computer to recognise one user's commands can be time consuming.

Speech output is increasingly common, however, and works on the principle of converting a message which has been keyed in or selected from screen options into digitised or synthesised speech. Digitised speech is 'real' speech which is recorded using a microphone attached to the computer; synthesised speech, as its name suggests, is created by an electronic synthesiser. Speech machines are available which store a range of messages, each of which is represented by an icon; long or complex messages may be produced by selecting several icons. The advantage of using computerised speech rather than signing or using symbols such as Bliss is that it is instantly recognisable by a far wider audience.

Once users have gained access to a computer, they have access to all the tools contained within it: word processing, desktop publishing, CD-ROM and multimedia, and even drawing and painting programs. This last group can be particularly valuable for the physically disabled whose motor control would prevent them from using paints and pencils. In addition to painting programs – where 'mistakes' can be instantly erased, and different colourways and 'fill' patterns experimented with



...The combination of mobility with access to learning goes a long way towards helping those with physical disabilities achieve an independent life



until the user is satisfied with the result – users can also select a wide variety of ready-drawn images from clip-art

libraries. Still video cameras, which capture images and digitise them, allow users to take their own photographs and incorporate them in other pieces of creative work. Using these and programs such as StoryMaker, users can write and illustrate their own stories, either real or imaginary.

...Where holding a pencil is too difficult, pressing keys on a palmtop computer may be an alternative

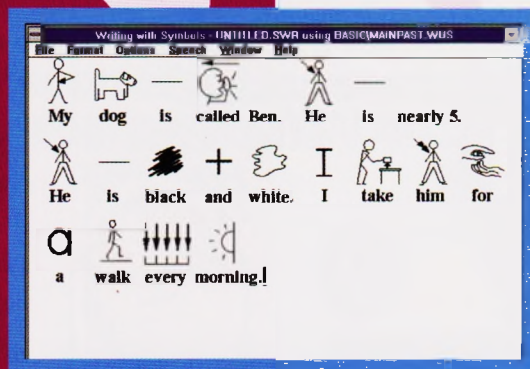


...Using a still video camera, a scanner and a painting package enabled Tony Jukes of Thurlow Park School to create a humorous piece for his GCSE art folder



coping with severe learning difficulties

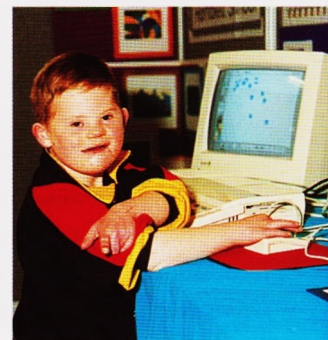
Those with severe learning difficulties inhabit a world which all too often sees them failing. Literacy, numeracy, life and social skills and physical aptitude can seem to elude them. Increasingly, however, examples are being found where IT can empower those with severe learning difficulties and enable them to experience success.



A range of programs use symbols to assist the development of both reading and writing skills. For those who have severe communication difficulties, the selection of an icon from a menu of symbols will be far easier than either writing or speaking. Learners who have poor memory skills or problems in sequencing can benefit from symbols, too, and may be able to experience success where words have failed them.

Joss, a Year 4 pupil, had had very little success in reading until his teacher tried using symbols on an overlay keyboard. Once he had put a sentence together, he could press a function key and hear the sentence read back to him. If he didn't feel it sounded right, he could go back and change it. The

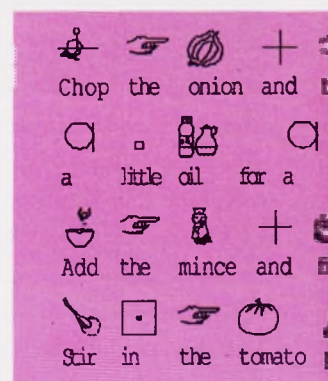
whole piece could be saved and read as Joss's own talking book. His parents were delighted when he brought material home that he could read to them. For the first time he was experiencing success with reading and was keen to practise and add to his new skill.



...Learning to make decisions is a major skill, from simple programs through to simulations of real or imaginary events

...Symbols can help students to manage data and to read instructions

As they move through the education system, students with severe learning difficulties need to develop decision-making skills and independence. IT offers a range of support, from keyboard overlays which help to develop life skills, to programs which use symbols in place of words, to



reading and writing packages, to moving and still video and multimedia.

A group of people in Coventry have produced a video to provide information about the discrete and integrated provision of family and adult education classes for adults with learning difficulties. The video group consisted of four people who were attending an English workshop. As well as filming a variety of classes they also filmed one student's journey to college and a befriender picking someone up for a class. These were included to provide potential students with a more detailed picture of what attending a class would involve.

The still video camera is proving to be a valuable tool for students with severe learning difficulties.

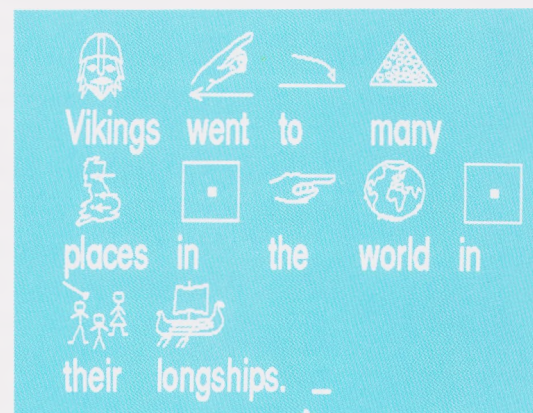
methods, and simple instructions added using symbols, words or a mixture of the two.

Electronic mail (email) is opening up new horizons in communication. One special school has developed links with a school in Norway.

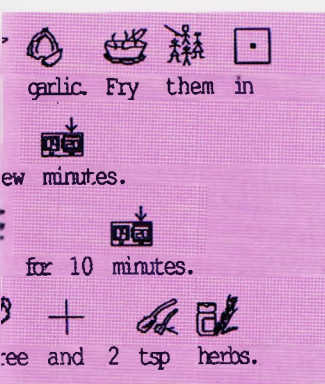
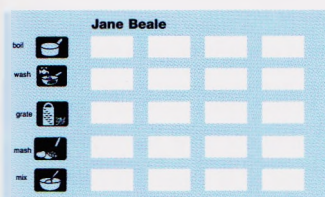
Apart from learning about life in a different country, these pupils are enjoying being treated as equals: the Norwegian children are unaware of their learning difficulties or how long it may take them to create a message before sending it.



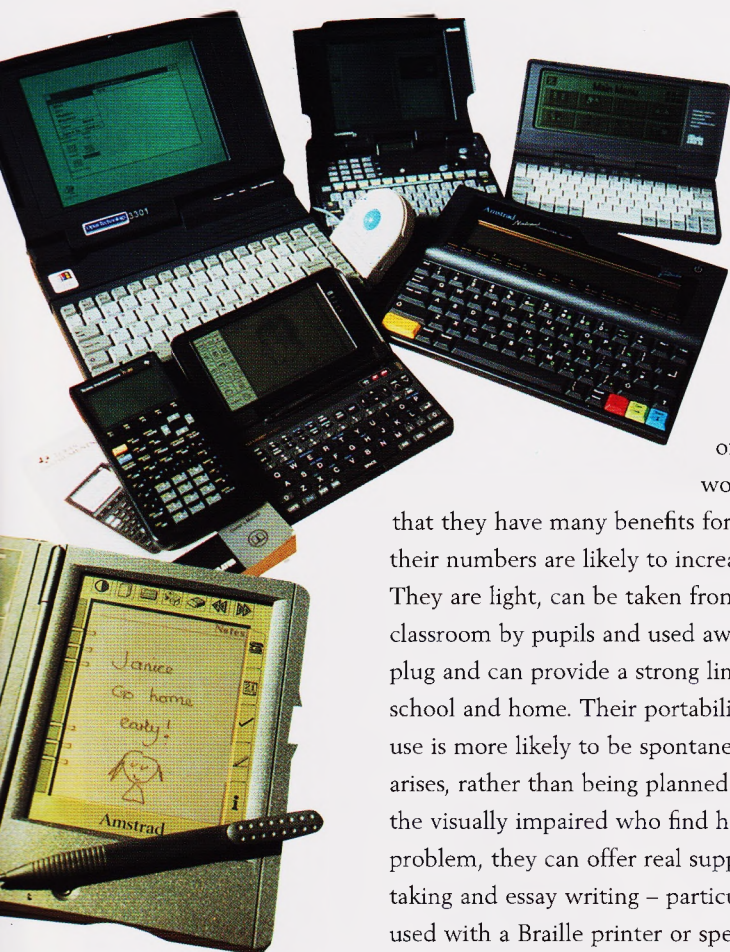
... Using a still video camera, students can use photographs to record practical work, for Records of Achievement



... Using multimedia with sound and animated pictures, learners can replay favourite scenes until they are ready to move on



It is simple to use and, unlike conventional cameras, the resulting pictures may be readily incorporated in other writing which may be altered or added to over time until the writer is satisfied with the result. A basic cookery book could be created, for example, using photographs of all the ingredients, the utensils and the



Portable computers, which were once the domain of the business world, have shown

that they have many benefits for education and their numbers are likely to increase in future. They are light, can be taken from classroom to classroom by pupils and used away from a mains plug and can provide a strong link between school and home. Their portability means that use is more likely to be spontaneous as the need arises, rather than being planned ahead. For the visually impaired who find handwriting a problem, they can offer real support in note-taking and essay writing – particularly if they are used with a Braille printer or speech output. For those learners with handwriting difficulties or dyslexia, they offer as many opportunities for revision or correction as are desired: you don't have to print out your writing until you are ready to do so. Portable computers also offer privacy, which can be important for students with learning difficulties when they are being taught alongside able peers – no one can see their work unless they wish to share it.

Voice input and output are also likely to play a large part in future developments in IT. Although in its infancy, voice activation of devices or software could truly liberate those who have almost no controlled movement. Meanwhile, voice output offers great support to those who cannot read screen messages.

CD-ROM and other multimedia technology is growing fast and as the number of CD-ROM players increases, so will the range of titles available. The multimedia features of CD-ROM –

sound, video, text and animation – make it a highly supportive medium for a variety of disabilities. Its interactivity is a potent motivator too, encouraging active participation and decision-making.

Integrated learning systems (ILS), relatively new to the UK although well known in the USA, may offer structured support to learners who have difficulties. An ILS delivers a programme of curriculum materials which can be tailored to the individual learner and with it, a record of the learner's performance; with some systems, the record may also include diagnostic features. It is clear that some learners gain considerable benefits from regular access to an ILS and as research continues, the potential gains for specific difficulties are likely to be identified.

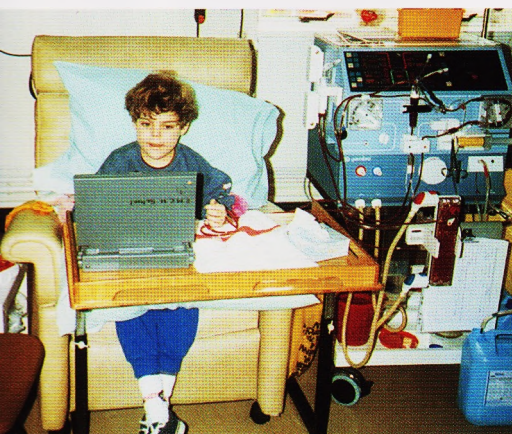
Research into specific software to help particular disabilities also continues.

Hitachi, for example, is developing a system to support the hearing-impaired which will enable someone to talk in a foreign language to a deaf person located far away. It features image recognition, voice recognition and

automatic translation. The deaf sender – Japanese, say – sits before a camera and computer, wearing gloves which help the computer to identify sign language. This is translated into Japanese text and then into the language of the recipient – English, perhaps. A voice synthesiser turns the English text into spoken text which is then transmitted down a telephone line to a videophone. The recipient's screen then shows the Japanese speaker accompanied by his or her words in both written and spoken English. In this example, the recipient doesn't need to know sign language and when sending a reply, simply speaks in his or her native language to the videophone and the process is reversed. Although this system is still at the development stage, its potential for the hearing impaired is clearly very promising.



... Integrated learning systems (ILS) provide a structured programme of learning through multimedia



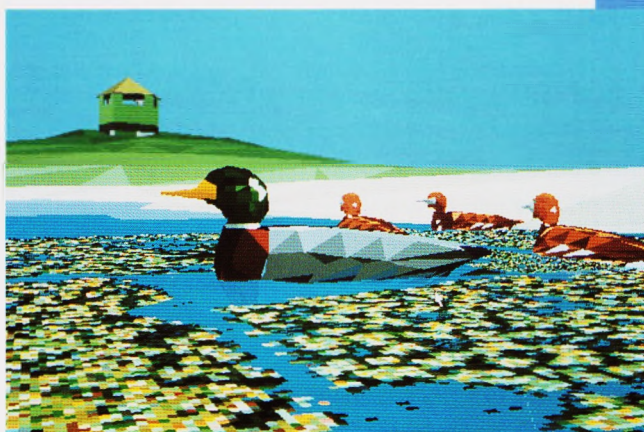
... A portable computer enables the learner to use it whenever he wishes – or needs to

the new technologies

Currently the Internet is attracting a great deal of publicity. Originally an archive of rather obscure material, the Internet is expanding rapidly and as it grows, the range of material available becomes of greater interest to education. Apart from the documents which can be accessed through the Internet – NCET offers a range of publications through this medium, for example – it also offers a forum for the exchange of information and networking. This is likely to be of interest to a number of groups who work with disabilities, both in full-time education and beyond. News groups may also offer help: requests for specific information are quite likely to get a response – if not from the UK then perhaps from another part of the world.

Finally, Virtual Reality promises interesting developments in the future. Its ability to simulate reality and enable users to interact with it, clearly offers at least simulated access to a wider world for those who are unable to experience it at first hand. As well as a vehicle for entertainment, VR has been used in projects around the world, to train wheelchair users and to help adults to overcome phobias.

... virtual reality is providing alternative access to sensitive wetland areas in the north-west



Technology has already done much to improve the learning and lives of those with learning difficulties and disabilities and future developments are certain to see new devices and new applications which will do yet more. One of the main advantages of IT is that its benefits can continue beyond school years.

"One thing that I did find good for me was when we had a go on a computer we found that I could write with a keyboard. For me it was like someone had switched the light on."

IT and the code of practice

The 1993 Education Act requires all schools to follow the Code of Practice on the identification and assessment of special educational needs. Schools are required to appoint coordinators of special educational needs (often called SENCOs) who will support the procedures stipulated in the Code of Practice. Whilst some schools were already carrying out similar procedures to those outlined in the Code, for others this approach is new.

In making an assessment of individual needs, LEAs are required to examine and evaluate the special needs provision which a school has already made for a pupil. Schools are expected to have 'explored the possible benefits of, and where practicable secured access for the pupils to, appropriate information technology'. Although the emphasis here is on access to the curriculum rather than on development of skills, special needs pupils are expected to have an equal opportunity with their peers to develop IT capability, so this assumes that skills will also be developed by using a range of software.

The Code makes it clear that where IT is considered to offer benefits to a pupil, training should also be supplied – not only for the child and his or her teachers but also for the child's parents so that equipment may also be taken home if this is appropriate.

Funding of IT equipment will be a major issue for many schools. The Code makes it clear that where special needs pupils are without Statements, it is the responsibility of the school to make provision. Special needs coordinators are therefore likely to find that their task is made

easier by close cooperation with the school's IT coordinator, which may result in a more flexible deployment of the resources available. In the past, LEAs often had difficulty in balancing the need to delegate funds to schools and the needs of the individual pupil for whom the funds were intended, a position made more acute as pupils moved from the primary phase to the secondary. The new Code is designed to help overcome this problem, by making more clear to schools and LEAs where their responsibilities lie.

Once a Statement has been issued on the special educational needs of a pupil, it must be reviewed every twelve months. For pupils aged over 14, a Transition Plan must also be drawn up after each annual review. Where IT is concerned, the annual review should include details of all items of hardware (computers, keyboards, printers and peripheral devices) and software to which the pupil has had access. Alongside these details should be an assessment of the learning opportunities given by IT and the learning gains which the pupil has made.

The transition of pupils beyond full-time education is still a problem, however. Any learner who depends on IT for communication and/or education itself is likely to suffer distress if, in addition to leaving the regular support of school or college, he or she also has to cope with leaving behind the IT equipment which has represented a lifeline. Clearly, what is needed is an overall plan which will ensure that the learner will continue to have access to a wide range of IT equipment in order that learning may continue as a lifelong process.

the SENCO project

IT support for special needs coordinators

A project was carried out during 1995 into the use of electronic communications by special needs coordinators (SENCOs). The project took place in twelve primary schools, nine secondary and one special school, spread across four LEAs. Funded by the DFE and NCET, the project gave each school sufficient funding to enable computer access to the Internet and LEA support services and initial training in using the technology.

The project found that although LEAs were supporting SENCOs with training related to the Code of Practice, additional training was generally

unavailable. Many SENCOs were feeling unsupported and in need of further advice and information. Once they had access to a means of communicating electronically with their LEA, in-service support and fellow SENCOs however, most of them made use of it. Particularly appreciated were the informal nature of communication and the speed with which responses were made.

"I can send a request for information down the line, instead of waiting until the support teacher comes next week."

Communications tended to focus on practical day-to-day concerns such as curriculum differentiation, implementing the procedures of the Code of Practice and obtaining information from others on dealing with particular forms of special needs. Many SENCOs appreciated the fact that being able to tap into the experience of others saved them from reinventing the wheel.

At the time of the first phase of the project, the SENCOs made relatively little use of the on-line information on the Internet. Since then, NCET has added on the World Wide Web its own pages of information on special educational needs and these will be available for the next project phase.

Apart from the special needs benefits attached to this project, some SENCOs found that ready access to a computer meant they were more likely to use IT for other purposes, such as record-keeping. Access to the computer was a major issue in itself: not surprisingly, greatest use of email tended to be by those SENCOs who had easy access to a computer and were working in a school which was committed to their use of IT. Time was also a factor, as many SENCOs found that their normal school day did not permit them to read their electronic mail. The most effective arrangement was for the SENCO to have a portable computer which could be taken home and used there as well.

A Software Guide for Specific Learning Difficulties, NCET, 1993

Access Technology: making the right choice, NCET, 1995

Access to Learning through Technology, NCET, 1995

Access to Words and Images – using IT to support the learning of students with physical disabilities, NCET/CENMAC, 1993

Extending Horizons, NCET/Imagination Technology, 1995

Hearing I.T.: using information technology with hearing-impaired pupils, NCET, 1993

In the Garden, NCET, 1992

Information technology and pupils with moderate learning difficulties, NASEN/NCET, 1995

IT for Adults with Dyslexia, NCET, 1994

IT Helps: using IT to support numeracy and literacy skills, NCET, 1995

Opening up the library for visually impaired learners, NCET, 1993

Portable Computers in Action, NCET, 1994

Self-respect and Independence: ways of using IT to support adults with severe learning difficulties, NCET, 1993

Special Edition: Extension to the CD-ROM in Primary Schools Initiative 1995, NCET, 1995

Starting Out, NCET, 1992

StoryMaker, NCET, 1992

Supporting visually impaired students in further education, NCET, 1993

Symbols in Practice: aspects of the use of symbols in learning, NCET, 1993

Writing and Learning with IT, NCET, 1994

further
reading

Switches and other devices mentioned in this book are available from a number of sources. NCET publishes a range of free information sheets which detail both equipment and suppliers; contact NCET if you would like an up-to-date list. Specific items mentioned are listed below.

Braille 'n' Print is a device which connects a Perkins Braille to a printer and is available from Concept Systems, 204-6 Queens Rd, Beeston, Nottingham NG9 2DB (tel. 01159 258588)

ClarisWorks is available from Apple suppliers

Co:Writer is available from Don Johnston Incorporated, 18 Clarendon Court, Calver Rd, Winwick Quay, Warrington WA2 8QP (tel. 01925 241642)

Developing Tray is available from LETSS, The Lodge, Crownwoods School, Riefield Rd, Eltham, London SE9 0AQ (tel. 0181 850 0100)

Franklin Wordmaster is available from a range of suppliers

HyperWrite (Apple) is available from The Hearing Impairment Service, Northern Resource Base, Queensway School, Queensway, Banbury, Oxon OX16 9NZ (tel. 01295 275926)

Lunar screen magnification software is available from Dolphin Systems, PO Box 83, Worcester WR3 8TU (tel. 01905 754577)

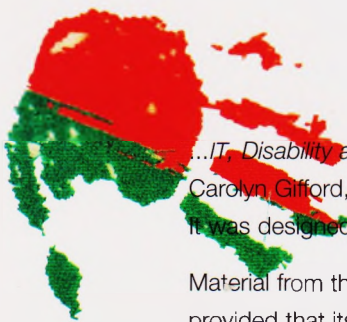
Myst (Apple/PC) is available from Softline, Mill House, Mill Lane, Carshalton, Surrey SM5 2WZ (tel. 0181 410 1234)

StoryMaker (Apple) is available from NCET at the address overleaf

Thinksheet (Acorn, PC) is available from Fisher-Marriott Software, 3 Grove Road, Ansty, Warwickshire CV7 9JD (tel. 01203 616325)

Write: Outloud is available from Don Johnston Incorporated, 18 Clarendon Court, Calver Rd, Winwick Quay, Warrington WA2 8QP (tel. 01925 241642)

software
and
hardware



...IT, Disability and Lifelong Learning was compiled by Sally McKeown and Carolyn Gifford, with additional material written by Carolyn Gifford. It was designed by Dodo, Mammoth, Reindeer and Fox.

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