

# Unit 9

## Basic ICT for pupils with a visual impairment

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The Learning Support Assistants who provide support on a daily basis for the pupils with a visual impairment mentioned in the Unit.

## Terminology

This Unit has been written for teachers and others working in all countries within the UK. There are differences in the legislation, terminology and structure of the educational systems in Scotland, Northern Ireland, and England and Wales and we have tried to reflect these in the document. In some specific Scenarios illustrating the use of ICT by individual pupils, we have given references to a scheme which is only applicable to one country – for example, the Literacy Hour in England and Wales – because it is necessary to make sense of the story.

For fuller information on terminology relating to each country, please see the section **Curriculum and Terminology in the UK**. This can be found at the back of your ICTS ring binder. You may well be corresponding with colleagues working in another part of the UK, and it will always be useful to have a common understanding of the language of education.

Throughout this Unit we have endeavoured to use the preferred spellings used by Oxford University Press and Cambridge University Press, as found in the current edition of the Oxford English Dictionary.

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## Introduction

This Unit covers basic ICT in the context of pupils with a visual impairment. The different media (visual, auditory and tactile) are explained, and their role in developing initial listening and the tactile skills of pupils is considered.

After introducing underpinning concepts, a number of scenarios are presented and explained, which demonstrate effective use of ICT for pupils in a range of circumstances.

Pupils with a visual impairment can make use of ICT such as overlay keyboards, talking word processors and touch screens to develop fundamental skills and concepts. These are the building blocks that can be used by older pupils to be independent and effective learners.

Both this Unit and **Unit 10 - ICT for visually impaired pupils** cover a similar range of underpinning concepts. However, the latter Unit also considers the technologies that pupils can use to study independently such as note-takers, text scanning systems and Internet access. It is anticipated that teachers will choose between these Units as appropriate to their pupils' needs and their own professional development plans.

## Visual impairment

Visual impairments in pupils take many forms; for example, pupils may be born blind, or may lose their sight as a result of injury or slow deterioration; in some cases the visual impairment is one aspect of multiple disability.

In these Units the term '**visual impairment**' is used broadly to refer to both blind and partially sighted pupils.

Pupils are often grouped according to the classifications blind or partially sighted, but these two classifications give little indication of levels of functional vision. The vast majority of pupils have some useful sight; the two key measures of vision, which give information concerning the impact of the visual impairment, are:

- acuity – how sharply and in how much detail the object is seen
- field – the area seen by the pupil as they look straight ahead

Each child's eye condition is quite specific and the impact it has on their learning is unique. How this functional vision is utilized will determine the impact it has on their development.

Much information is gathered concerning the pupil and assessments often take a multidisciplinary approach. Input is gathered concerning the child's functional vision, mobility needs, psychological functioning and curriculum access needs, including the possibility of utilizing technology. Once gathered, this information must be collated to evaluate the overall effectiveness of the organization of the learning environment, make recommendations for the strategic implementation of specific strategies to afford greater independence when accessing the curriculum and, at the same time, provide further tools to complement existing teaching programs.

## Expected outcomes

**By the end of this Unit, participants will...**

- have an understanding of what basic ICT means in the context of pupils with a visual impairment
- have an understanding of the key issues involved in making appropriate ICT choices for pupils with a visual impairment
- be aware of the complex and unique needs of pupils with a visual impairment in relation to technology intervention
- be aware of possible basic technology solutions to implement within the learning environment of pupils with a visual impairment
- be aware of ICT-based activities to support pupils' progress towards identified teaching objectives
- have an understanding of the contribution technology makes to the assessment of learning, being able to make decisions concerning its appropriateness.

## Key skills covered in this Unit

**Adapt the input medium through the use of tactile or visual labels**

Alter the labels on the input device, for example using keyboard stickers or adapting the labels on a programmable robot.

See Scenario 1

**Use a programmable floor robot**

Develop spatial awareness, positional concepts and improved use of functional vision through the use of a programmable floor robot.

See Scenario 1

**Use a low vision aid to access printed materials independently**

Control the size, contrast and position of an image through the use of a magnification system. (CCTV)

See Scenario 2, Example 2a

**Use a talking word processor with on-screen word banks**

Adopt a multi sensory approach to support emergent literacy skills through speech output and enlarged on screen text.

See Scenario 2, Example 2c

**Configure the screen to allow a pupil to make the most use of their functional vision**

Configure toolbars, screen presentation, enlarged mouse pointer and text presentation size to suit the individual visual needs of the pupil.

See Scenario 2, Example 2c

### **Configure speech output options to respond to a pupil's preferences**

Alter the voice, pitch, speed, prosody, character and word or sentence echo to suit the preferred needs of the pupil.

See Scenario 2, Example 2c

### **Set up and configure a Braille with additional peripherals, keyboard and printer**

Provide a Braille production system, which provides hard copy Braille, has Braille and 'QWERTY' input and has the flexibility to provide speech output for people with and without Braille skills.

See Scenario 2, Example 2d

### **Design and create tactile overlays**

Use equipment to produce tactile diagrams to support the demands of the curriculum through the use of specialist equipment.

See Scenario 2, Example 2e  
Scenario 3, Examples 3a, 3c, and 3d

### **Design and create on-screen grids (with / without switch access)**

Develop tailor made and differentiated grids to support a breadth of curriculum requirements and access needs, altering content, presentation and input method.

See Scenario 3, Example 3a

### **Use authoring software to develop appropriate curriculum materials**

Use framework packages such as *PowerPoint*, *IntelliPics* and *SwitchIt! Maker* to design differentiated materials to develop appropriate curriculum materials.

See Scenario 3, Example 3b

### **Use technology to support the development of eye-hand coordination**

Use commercially produced or individually tailored applications to assess and develop eye-hand coordination, making adaptations where appropriate.

See Scenario 3, Example 3e

### **Use ICT to support the development of keyboard familiarity and keyboard skills**

Use PC-based exercises to develop keyboard familiarity and skill through the enhancement and adaptation of the screen presentation and speech output.

See Scenario 3, Example 3f

### **Use key strokes as appropriate to replace the need for positional mouse clicks**

Develop and awareness and understanding of the use of key strokes to replace the need for positional mouse clicks where movement of the pointer inhibits visual tracking and location.

See Scenario 3, Example 3g

## Scenarios

Throughout this Unit the term ICT (Information and Communications Technology) is used to mean basic specialist computer hardware and software which is relevant to pupils with a visual impairment. For pupils with a visual impairment ICT primarily embraces:

- modifications to the output medium through either visual, auditory or tactile strategies
- modifications to the input method to allow the unique needs of the pupil to be best met
- developing strategies to complement existing teaching methods whilst promoting greater independence when accessing the curriculum

Information and Communications Technology (ICT) has the flexibility to respond to the uniqueness and potential impact that the visual impairment has upon learning.

ICT is widely regarded as a key element in the education of pupils and young people and within the National Curriculum, all pupils being required to become familiar with a range of technological applications and develop the necessary skills to use them within their everyday learning environment.

***However, in addition to the curriculum requirements, for the pupil with a visual impairment, ICT facilitates independence by enabling them to take more control over their learning. It can allow access to areas of the curriculum from which they may previously have been excluded.***

This Unit examines ways in which basic ICT can help pupils with a visual impairment to **access the curriculum** effectively. In most cases the pupils will be accessing exactly the same curriculum as their peers, but will need to make extra use of technology.

Because pupils with a visual impairment may need to use ICT across most areas of the curriculum, you will need to be aware of the many different ways ICT can be used across the whole curriculum. Then you will need to address the specific access issues of your pupils.

All the examples in this Unit focus on **curriculum** uses of the technology and show how individual pupils have been given access to that area of learning. The activities at the end of the Unit will help you to incorporate the technology into the **learning outcomes** your pupils need to achieve.

Pupils with a visual impairment who develop technology skills at an early age, become confident in utilizing and harnessing its capabilities to extend their learning horizons. It provides them with the following invaluable tools:

- **communication** – technology provides an alternative means of reading and writing and is used to process and communicate ideas.
- **improved access to information** – the way in which information is presented to a pupil with a visual impairment determines the level of accessibility. Information given in an electronic form can be accessed in a way most suitable to the needs of the individual.
- **curriculum** – technology can be used as a curriculum tool to help develop concepts in all subject areas.
- **production of learning materials** – only a tiny percentage of curriculum materials is currently available in alternative formats, but with the appropriate technology equipment and training, it is possible to present learning materials to pupils in a format relevant to their needs.

***As well as bringing new opportunities and opening up many possibilities, technology also presents a range of challenges.***

Many software packages and CD titles can simply be installed to the PC and run without much assistance. Unfortunately they are usually the pieces of software which can not be edited or adapted in any way to suit either the visual or learning needs of the child. Many concepts developed within the early learning phase are based on visual concepts; 'match these colours' or 'find all the red ones', for example. Software that relies heavily on visual concepts should be avoided as they may be outside of the pupil's direct experiences. Other applications, often called 'framework' packages allow editing and adaptations to be made so that the specific needs of the child can be tailored for. To best use them, the teacher, LSA or parent needs to feel confident in their use of technology and be able to configure the applications to suit individual needs.

The nature of the visual impairment will obviously have a major effect on the accessibility and suitability of a piece of software. Where a child has functional vision, much can be done to a standard PC to ensure that the child's visual needs can be best met. This may be as simple as changing the pointer size or test for menus or for example with a word processor, changing icon size, menu bar content, and style of font. Consideration's when evaluating the suitability of a piece of software or a CD title for a child with partial sight are:

- Can the appearance of the screen be adapted and enhanced?
- Can colours be changed?
- Can font sizes be altered?
- Can the content of the software be edited to better suit the needs of the child?

For a child with no useful vision there are more technical considerations to be made when thinking about software or CD titles. Many children who are blind use speech output systems to access software but not all applications are accessible to screen readers. Software that is highly graphical will not be read by a screen reader, as there is a need for 'test' to make sense of a screen's content. It is impossible to produce a list of accessible CD titles as development is so rapid, the list would soon be out of date. CD titles for younger learners can however be made accessible but the process is quite demanding of the teacher or parent and needs additional software.

Before purchasing software the following questions need to be asked:

- What does the child need to use a computer for?
- Is this the most appropriate tool?
- Can the software be edited to take into account the specific learning or visual needs of the learner?
- Is the software appropriate to the age of the child?
- Is there a clear understanding of what the software will achieve?
- How will their visual impairment cause difficulties seeing the screen or using the mouse?
- What software is available at school?
- Who will support the child when using the software?
- How comfortable is the teacher, LSA or parent using technology themselves?
- Will extra training be necessary?

Irrespective of rapid advancement and development, it must be acknowledged that technology still cannot overcome all difficulties. The benefits of technology can only be realized when careful consideration is given to assessment of the needs of individuals, training for staff and pupils, and appropriate selection of resources.

## Scenario 1 – Learning with peers

Pupils with a visual impairment can benefit immensely from the use of basic ICT within their learning environment. Unlike paper resources, technology can present information tailored to the idiosyncratic needs of the pupil with varying levels of stimuli. It is able to adapt to changes within the individual without imposing a constraint on learning or restricting styles and opportunities. Inclusion can be supported and made a reality through the use of appropriate technology, but in isolation is not sufficient. It is not just about access but about promoting engagement in learning tasks alongside their peers. This can only be achieved where technology is fully integrated into the learning environment rather than haphazardly bolted on.

### Example 1 – James

James has retinitis pigmentosa, which means he has reduced peripheral vision and therefore sees through a small tunnel. He also has great difficulty in dim light when he often appears clumsy and uncoordinated. He attends a mainstream school, which has a support unit. The class are developing positional concepts and spatial awareness skills through the use of Roamer – a programmable floor robot.

They have used the story of Little Red Hen to add meaning to Roamer's movements and have made costumes and props to use during the activity. His teacher added large labels to the control panel to make discrimination easier. Because of his visual impairment, James finds it difficult to track moving objects, but by programming Roamer to move and to produce sound, he has developed further use of his functional vision. The whole class has enjoyed using Roamer and have had great fun programming its actions. It has provided opportunity for discussion and the sharing of ideas for the whole class, allowing everyone the chance to join in.



joining in with the Roamer

### Key skills and equipment

The key skills for the above example are the ability to:

- use a programmable floor robot
- adapt the input medium through the use of tactile or visual labels to allow James to use the control panel

The key equipment is:

- programmable floor robot

### Selection of appropriate technology

The choice of appropriate technology will depend upon the level of functional vision and the most appropriate **output** medium and **input** method.

Essentially there are three methods or modes of output, which can be modified to improve accessibility for pupils with a visual impairment:

- **visual**
- **auditory**
- **tactile**

The input method again will depend on the abilities of the child:

Examples are –

**switches**      **touch screen**  
**on-screen overlays or grids**

**overlay keyboard**  
**QWERTY keyboard**

**mouse clicks**  
**voice recognition**

## Scenario 2 - Modifications to the output medium

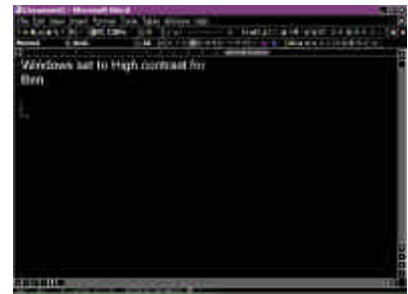
### Visual medium

Information presented on screen may often be inaccessible to a pupil with little vision. Therefore, to gain access to standard resources, adaptations have to be made to alter the appearance of the screen display. A computer screen offers a display medium with the potential to alter colour, contrast and brightness to suit individual preferences. The standard colour and size settings of the computer display can also be difficult to see, which provide additional problems for a pupil with a visual impairment. The choice of presentation font may also cause the pupil to have difficulties; it is generally accepted that in most instances *sans serif* fonts are easier to read and cause less confusion than ornate *curative* fonts. There are, however, features available within the operating system of a computer which can be customized to the user's preferences.

### Example 2a - Ben

Ben has cone dystrophy and nystagmus; for him this has resulted in colour blindness, reduced distance acuity, and he is highly photophobic. There is a computer permanently located within his classroom which has been moved away from its original position under the window and blinds have been fitted to reduce glare.

The default contrast settings for the computer cause Ben discomfort when trying to read the screen. Often text was displayed with a bright white background so his teacher has set up a user profile with the high contrast settings turned on (found in **Control Panel, Accessibility Options**). This resulted in a black background with much less glare. His teacher is careful to ensure that any activities he engages in using the computer are not centred around the learning concept of colour matching or discrimination.



high contrast settings for Ben

### Key skills and equipment

The key skill for the above example is the ability to:

- adapt the visual input medium by changing the configuration of the screen

The key equipment is:

- the changes were effected within the functions and operating system of a standard computer

Where there is a need for greater enlargement, screen magnification software is available. The user determines the level of magnification necessary and views the screen a portion at a time. This magnified *window* is moved around to enable the rest of the screen to be read as required.

If larger sizes of magnification are required, then some magnification packages can support this with the addition of speech output. *Lunar Plus* and *Zoomtext* are two widely used applications which allow the user to configure the screens magnification, screen movement and speech output to suit their particular preferences.



Further examples of screen magnification software can be found in Appendix 5.

Where applications are predominantly graphical, and magnification is added, some functionality may be lost and only limited access may be expected – CD-ROMs and simulation applications for example may not always be fully accessible. Software designed to include highly complex graphics may present attractive and stimulating environments for sighted learners but may present an inaccessible and meaningless barrage of information to the pupil with a visual impairment.

Many pupils with a visual impairment are unable to see standard text on paper without some form of enhancement. It is possible to enlarge text with a photocopier but often this is not ideal. One solution is to use a **Closed Circuit Television (CCTV)** magnifier. A CCTV uses a camera, either hand-held or fixed, to magnify text and display it on a monitor.

### Example 2b - Gemma

Gemma is five and has macular degeneration, which for her means she has difficulty seeing fine detail and has to use eccentric viewing techniques. Gemma has loss of the central field and has a tendency to look to the left of an object, using her peripheral field of vision. This peripheral vision is however less sensitive to colour and detail than central vision, resulting therefore, in lack of clarity.

During the literacy hour she is unable to see the big book used by the rest of the class so she has her own copy which she is able to read with the help of a CCTV magnifier. The CCTV offers her independent control of the size and contrast of the image, and allows her to join in with the group reading sessions and discussion. It is important that she has access to the same reading material as her peers and is able to enjoy the colour images found in books for young readers. The rest of the class also find the CCTV magnifier useful for magnifying objects to get a closer look. Gemma also shares reading material such as comics and magazines in the reading session with her friends. They have two copies, one read under the CCTV by Gemma and the other read by her friend; this way they can enjoy and share a reading activity together.



sharing a book with the help of  
CCTV

### Key skills and equipment

The key skill for the above example is the ability to:

- use a low vision aid to access printed materials independently

The key equipment is:

- CCTV

As well as the intervention of ICT, there are several very simple adaptations to consider within the working environment of a pupil with a visual impairment that can be employed to make mobility and learning more effective. Changing the crucial variables to vision to maximize their visual potential, such as light and contrast, will result in an environment which will allow the individuals to function comfortably using their available vision or other senses.

## Auditory medium

Computers have the ability to produce sound via an internal sound card. The speech output used in talking applications varies in quality and it is of two types:

- **digitized** – this is **real** speech or sound that has been recorded on the computer and is played back when initiated by the user. The quality of the speech is very good, and the author can make the material more interesting by speaking in a lively voice. However, the pupil is limited to hearing the sound clips that have been recorded. A welcome or reward message might be created using digitized speech, for example.
- **synthesized** – the words are spoken with a computer generated voice. The speech sounds a little more robotic than a recorded voice but, as any text in the computer can be spoken using this technique, it is far more flexible. The child's preferences for speed, pitch and volume can all be accommodated. This type of speech might be used to read back words that have been typed into a word processor.

The amount of speech support varies within educational software. In many applications, a positional mouse click is necessary to activate audio files whereas some applications have the capability to announce text entered and read the text in menus. Eventually a pupil who is totally blind will need to use a program known as a **screen reader**, which will give access to all areas of the computer. It is therefore vital that listening skills are developed early and the pupil becomes accomplished at extracting information through sound.

When a person without sight wishes to compose text using a computer, there has to be the addition of speech output. The word processor must be able to provide feedback such as speaking the entered text, give a read-back facility to check entered text and also provide access to functions such as print and save. Talking word processors have many benefits for the pupil with a visual impairment; they provide speech feedback as text is entered and offer speech feedback to proof-read text. For pupils with a useful level of vision the appearance and layout of the screen can be configured to meet their individual needs.

## Example 2c - Amy

Amy has aniridia and nystagmus, which for her means that she becomes tired after prolonged periods of reading. Her handwriting is poor, often illegible, and she has become demotivated to produce work. She has started to use a talking word processor with on-screen word banks to develop her writing and increase her vocabulary. By positioning the word banks on the screen, the effects of the nystagmus are minimized as she does not have to continually refocus between paper word lists and the screen. The display of the word processor has been changed to best meet Amy's visual needs by setting the background colour to black and the text to white. The toolbars have also been configured to reduce surplus information and unused icons. To help Amy proof-read her text without fatigue, speech output is used to **read back** what she has written without the need to track or refocus on the screen.

## Key skills and equipment

The key skills for the above example are the ability to:

- use a talking word processor with on-screen word banks – designed to reflect the vocabulary needs and interests of Amy
- configure the screen to allow Amy to maximize use of her functional vision
- configure the speech output options to respond to Amy's preferences for speed, pitch etc.

The key equipment is:

- talking word processor with the option to change speech and screen preferences
- application to design on-screen word banks / grids

## Tactile medium

Pupils who are totally blind have no access to printed pictures and diagrams unless they are presented in a tactile form. Turning material into a tactile form can make the information accessible to the pupil with a visual impairment, improving the opportunity for a broader curriculum. However information is not made meaningful by simply raising it above the surface of the paper. Consideration must be given to the **nature of the information** being presented. Tactile representations of drawings are rarely of use to blind pupils if they bear no relation to a child's experience of the texture, shape and sound of the object.

However, with thought, a representation can be drawn on paper with a dark pen. Equipment is available which then raises these dark lines to produce a tactile version. Examples of tactile resource production equipment can be found in Appendix 5.

Braille is still the main communication medium for pupils who are totally blind, although Moon is also used by a few who find the Braille code too complicated to learn or who have difficulty with fine tactile discrimination. Braille can be produced by hand or through the use of software which converts text into Braille and uses a Braille printer (embosser) to produce hard copy. Electronic Brailleurs can be used by teachers and pupils in class to produce instant Braille and may also be connected to an ink printer to produce a text copy. For further information on more advanced ICT systems see **Unit 10 - ICT for visually impaired pupils**.

### Example 2d - Richard

Richard has recently experienced loss of his vision, meaning he can no longer access print. He is beginning to develop his Braille skills and uses a Mountbatten electronic Braille to produce hard copy Braille. Unfortunately, only one of the teachers within the school is able to read or write Braille so the Braille has been connected to an ink printer to produce a text copy of his work alongside the Braille copy. The Braille is also used by teachers who do not have Braille skills by attaching a 'QWERTY' keyboard to the Braille and inputting text. This is then translated and a Braille copy is printed. This additional facility means that other pupils in his class can write notes to Richard in Braille and he can write to them in print.

#### Key skills and equipment

The key skills for the above example are the ability to:

- set up the Mountbatten with additional peripherals, keyboard and printer
- understand the commands and operation techniques for the Mountbatten

The key equipment is:

- Mounbatten electronic Braille plus peripherals



using a Braille

### Example 2e - Cameron

Cameron is registered blind and has both physical and learning difficulties. To develop his literacy and communication skills he has begun to learn Moon. He is able to identify the letters of the alphabet and is currently developing early reading skills. The Moon is sized to ensure he has good tactile discrimination and tactile areas are added to enhance understanding and enjoyment.

Short Moon books have been created by his teacher which also have pictures and text in them so his peers can also enjoy the reading activity. The books are created using a Moon font which is printed onto swell paper; this is then heated through a fuser to produce raised Moon in the required size. To further enhance and supplement learning opportunities, Moon overlays are used in conjunction with an overlay keyboard and an application called *Soundbook* which has digitized sound programmed to specific cells. This allows Cameron to independently 'read' tactile books whilst at the same time developing his tactile discrimination abilities for the Moon communication code.

## Key skills and equipment

The key skills for the above example are the ability to:

- produce Moon resources with a fuser – both reading materials and tactile overlays
- program an overlay keyboard application to produce digitized sound

The key equipment is:

- Moon font and fuser to produce raised tactile resources
- overlay keyboard and appropriate software e.g. *Soundbook*, *Concept Plus*

## Scenario 3 – Modifications to the input medium

A child's visual functioning, physical and cognitive abilities will impact upon the way they interact with technology, not least in the way they are able to control the input process. Adaptations to the mouse and keyboard allow many pupils with a visual impairment to gain access, but alternatives are available where this is not suitable.

## Switches

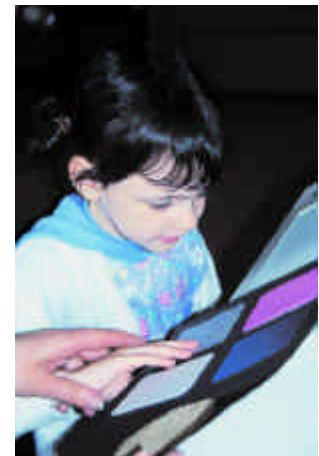
The young pupil who is blind will have no knowledge of the keyboard and the potential for interaction with the computer. The use of a switch with a simple cause-and-effect application or indeed appliances such as hairdryers or toys, will introduce them to the concept of causation and environmental control. Some pupils will then be able to move onto other input devices whilst some will develop choosing skills through the use of two switches and auditory scanning (see **Unit 8 – The development of switching skills** for more general information about switch access).

For a pupil who has partial sight, a switch may be used as an introduction to input devices where there is a need to minimize distraction from a busy keyboard. The pupil is able to engage in simple choice or matching activities to develop discrimination skills, whilst difficulties with input are minimized.

### Example 3a – Sophie

Sophie has retinal dysplasia which means she is totally blind. She is beginning to develop Braille skills but finds tactile discrimination difficult.

She enjoys using a tactile overlay with Braille labels to listen to poems with lots of sounds effects. Her teacher is keen that she develop her listening skills and the ability to make choices when information is presented through sound. As curriculum demands increase, she will need to use her listening skills more and eventually use a screen reader to obtain full access to a computer. *Switch Clicker* has been used to design and create on-screen grids from which Sophie can choose which poems she would like to hear.



using tactile switches to begin to understand controlling the computer

Currently she is using two switches to control the auditory scan and selection of the poem. The teacher intends to move her towards using designated key strokes to scan and select and eventually use the on-screen grids with a talking word processor.

## Key skills and equipment

The key skills for the above example are the ability to:

- design tactile overlays relevant to the needs and interests of Sophie
- operate software used to design overlays
- design on-screen grids and implement through the use of switches

The key equipment is:

- overlay keyboard
- overlay design software e.g. *Overlay Maker*, *Soundbook* or *Concept Plus*
- on-screen grid application e.g. *Clicker*
- variety of switches
- equipment to produce tactile overlays

## Touch screen

It is often difficult to establish how much a young pupil is able to see and the mechanics of eye-hand coordination may pose a barrier to developing visual skills. Touch screens allow the pupil to focus on both their hand and the screen contents at the same time, without the need for exaggerated hand movements.

The use of a touch screen with standard point and click software may give an indication of the child's functional vision. Many simple touch screen / monitor applications exist and simple authoring tools allow design and creation of tailor made screens to meet more of the individual interests and abilities of the child.



a range of different methods of access, including touch

The touch screen is not a suitable input method for a pupil who is totally blind. Although it can be used as an input method to develop causation skills, unlike switches, there is no potential for progression or more complex usage based on tactile discrimination. It should therefore be avoided and a more appropriate method explored.

## Example 3b - Davinder

Davinder has ocular albinism which results in extreme photophobia (intense dislike of light), low vision, poor tracking skills and difficulty following and focusing on moving objects. It has also been extremely difficult for her teacher to establish what use Davinder is making of her peripheral vision, as when she lacks interest in an activity she can be very uncooperative.

A touch screen has been purchased with a range of touch screen software. Despite an enthusiastic start, Davinder soon lost interest in the applications as the same images appeared, many of which were not simple enough for her to identify.

Davinder's teacher designed and created her own screens by importing simple images into *PowerPoint* and creating a presentation activated by a screen touch by Davinder. Her teacher now has much more accurate information about how Davinder is using her functional vision and by using the features of the software, has been able to train her to use it more effectively. The teacher has used this information about Davinder's sight to create resources to support a number of curriculum areas. One such resource is a sequence of screens designed to help identify shapes in Maths. A selection of shapes are given on screen and a question posed, Davinder has to correctly identify the requested shape by pointing at it. The area pointed to obviously evokes a varied auditory response based on accuracy. The technology based activity is also reinforced by hands on investigation of two and three-dimensional objects.

### Key skills and equipment

The key skill for the above example is the ability to:

- design appropriate screens through the use of a multimedia authoring package

The key equipment is:

- multimedia authoring package e.g. *PowerPoint*, *Hyperstudio* or *SwitchIt! Maker*
- touch screen (Touch Monitor)

### Overlay keyboards

Overlay keyboards potentially offer pupils with a visual impairment a combination of sensory stimuli. Tactile overlays, speech output and visual representation can be combined in the most appropriate ways to enhance access and participation. Overlay keyboards have long been used as an alternative input device for word-processing but there are many other uses. Applications exist to create talking books which are accessed via a tactile overlay and output audio samples. *Soundbook* from RCEVH is one example of a simple application which allows the pupil to press tactile areas to activate digitized sound samples.



a tactile overlay on IntelliKeys

### Example 3c – Hussain

Hussain has lebers amaurosis which means he was born blind. He is developing his Braille skills but finds the process of tactile tracking very difficult and is completely disinterested in reading. To try to encourage him to participate more readily in reading activities and improve his tactile skills, his teacher has introduced *Soundbook* to the classroom. *Soundbook* is software which uses a tactile overlay to activate audio files.

The overlays are designed to encourage tracking over a set of tactile markings from left to right with two hands in the same way that Braille is read. The stories have a predictive and repetitive nature to provide the pupil with familiarity and confidence to engage in the activity. For a sighted pupil, pre-literacy activities would involve enjoying pictures and extracting contextual meaning. In the same way, Hussain is not only able to extract information from the sound samples but also, alongside his peers, enjoy 'reading' stories, reinforce concepts and develop tactile discrimination skills.



using a tactile overlay on a Concept Universal

### Key skills and equipment

The key skills for the above example are the ability to:

- design tactile overlays relevant to the needs and interests of Hussain
- operate software used to design overlays for story reading

The key equipment is:

- overlay keyboard
- overlay design software e.g. *Soundbook* or *Concept Plus*
- equipment to produce tactile overlays

A tactile overlay may also be created which allows the pupil to launch applications or control devices. Often the accurate syntax needed to enter information into a computer causes difficulty and frustration on the part of the child. As the pupil is developing familiarity with the operating system, experiences need to be positive and actually facilitate learning rather than pose greater barriers.

Other applications provide the option to create quizzes and access CD-ROM titles via a tactile overlay. *ClickIt!* and *IntelliPics* provide the opportunity to create customized resources, differentiated to the needs of the individual. Examples of overlay keyboards can be found in section Appendix 5.

### Example 3d - Charlotte

Charlotte is totally blind and also has learning difficulties. Although she is developing Braille literacy, she has experienced difficulty in reading certain Braille letters. *IntelliPics* was used to create a talking quiz made of character and spoken letter matching activities. A tactile overlay was made by presenting a randomly placed selection of characters in rows and programming an associated spoken message. Charlotte was able to explore the overlay and was given auditory feedback as she pressed each letter. A quiz was created that asked her to find particular letters on the board. The software gave positive feedback when she was right and further prompts when her response was incorrect.

#### Key skills and equipment

The key skills for the above example are the ability to:

- use an application to design and create quizzes
- produce tactile overlays

The key equipment is:

- application to design and create activities e.g. *IntelliPics*
- equipment to produce tactile overlays

#### On-screen overlays or grids

When pupils begin to compose through the use of a word processor they often need to use word banks or dictionaries to enhance and develop their vocabulary. For partially sighted pupils, having to refocus between paper and screen can be very tiring. On-screen grids and word banks are available and have the flexibility to present information in a way suited to the visual needs of the individual child. Examples are *Clicker* and *Inclusive Writer*.

#### Mouse clicks

Many applications need positional mouse clicks to activate sound, animation or page turning. This is especially the case with CD-ROM titles.

For the pupil with partial sight to get the most from their computer, adaptations need to be made to the pointer. It is generally a small, fast-moving arrow with little contrast to the desktop background. This can obviously cause difficulty and may prevent successful use of the screen layout.

There are several modifications which can be applied to make the pointer easier to use. These include:

- changing the **colour** of the pointer to improve contrast
- **enlarging** the pointer to make it easier to see
- adapting its **movement** by adding or removing trails, or slowing it down
- highlighting its **position** by making it flash or rotate
- **magnifying** or **animating** it with utility software

Some of these functions are available as options in the computer (see **Unit B - Organizing your Resources**). Others can be downloaded from the Web (See Appendix 4).

Where these adaptations are not appropriate or sufficient, you can use a utility application which adapts and magnifies the appearance and movements of the mouse pointer on screen. Examples of mouse enhancement applications can be found in Appendix 5.

Some pupils find eye-hand coordination and tracking visual movement, or both, difficult. Many computer applications provide opportunity to practice and develop mouse movement and visual perception skills, where rewards are given in the form of audio output or animations. Applications such as *Clicker* may be used to create resources where there is a need to differentiate content specifically to the needs of the child. Applications such as those available from Sensory Software provide instant access to a number of activities.

### Example 3e - William

William has cortical visual impairment and nystagmus. This means he has difficulty visually tracking objects and also has very poor fine motor control and great difficulty with eye-hand coordination. He is able to see the screen well and has enjoyed using *Naughty Stories*; he does however find it difficult to navigate the mouse pointer around the screen.

Software is available to develop pointer navigation skills in young pupils. His teacher introduced these applications to William and there has been a vast improvement in his ability to move and position the pointer. He is now able to more independently access CD-ROM resources designed to reinforce specific curriculum areas like the rest of his class.

### Key skills and equipment

The key skills for the above example are the ability to:

- establish where use of technology is appropriate when trying to develop eye-hand coordination
- implement interesting and stimulating activities responding to the visual needs of the child

The key equipment is:

- visual training applications e.g. *My World*, *Foundation Mouse Skills*, *Touch Funfair* (used with the mouse)



Foundation Mouse Skills to help learn mouse pointer control

Independent access to CD-ROM titles for young pupils who are totally blind has not been possible in the past. There are now applications which attach **hotspots** to areas of the screens, allowing the pupil to navigate around the screen with either switches or key strokes. The hotspots are attached to areas where something would happen if you clicked the mouse, or sometimes, if you move the mouse pointer over it.

*ClickIt!* is an example of such a program. It allows the teacher to add hotspots to the screen in appropriate areas where the pupil will need to activate something such as hear the text or turn the page.

Creating hotspots does demand a high level of ICT competence from individual teachers, so suppliers are currently developing hotspots to use with popular CD-ROM titles.



creating hotspots for a CD-ROM using ClickIt!

Where there is a need to tailor the content of the presentation more specifically to the needs of the individual child, authoring applications can be used to design and create **talking books**. *PowerPoint* for example, is widely available and allows the teacher to create screens with pictures, text and sound the pupil finds interesting and also meets their visual needs. These types of programs are referred to as multimedia authoring tools.

## QWERTY keyboard

Keyboard skills are essential for pupils with a visual impairment if they are to use a computer with a 'QWERTY' keyboard. As curriculum demands and the quantity of text produced increases, it is vital for the pupil to have good keyboard skills.

Initially the pupils will need to gain familiarity with the location of the keys and eventually be able to confidently use these skills to support curriculum access in areas such as word-processing. In the context of visual impairment, keyboard skills can be defined as being able to accurately and consistently access the keyboard without visually locating the keys, whilst using correct fingering. Accuracy is of far greater importance than speed.

Good keyboard skills enable the pupil to accurately record their ideas with a word processor, avoiding the frustrations of not being able to find the correct key. If the pupil has to constantly visually locate the key on the keyboard, the effects of a visual impairment may be exaggerated.

When a computer user is able to enter text without visually locating the keyboard, they demonstrate a much more efficient and effective use of technology. There are many keyboard training applications available but few have the ability to change and adapt the display on screen.

Key features to look for are:

- uncluttered screen where presentation can be edited to suit the visual needs of the user
- opportunity to repeat lessons at any level – not to have to repeat previous exercises
- feedback about progress
- ability to create exercises that use words that fit the ability and interests of the pupil
- speech feedback of text displayed on screen
- an interesting and fun presentation to add motivation to what may otherwise be a very boring drill-and-practice exercise

### Example 3f – Jessica

Jessica has nystagmus which means that she has difficulty visually locating the keys on the keyboard and also has difficulty refocusing on the screen when she looks up. She enjoys using a talking word processor to record her work across a range of curriculum subjects, but becomes very frustrated and makes many typing errors. Her teacher implemented a programme of keyboard training, involving 10 to 15 minutes each day with software that gives speech output and allows the user to change the font size to best suit their visual needs. Jessica is now able to more accurately find keys without having to hunt and peck and constantly look at the keyboard.



using TouchType to learn keyboard skills

### Key skills and equipment

The key skill for the above example is the ability to:

- support the use of a touch typing tutor which will develop keyboard familiarity

The key equipment is:

- touch typing tutor with speech output and the ability to adapt the presentation e.g. *Touch Type*

There are now many alternatives to standard keyboards to allow easier access for the pupil including condensed, expanded and ergonomically designed keyboards and those with the addition of keyguards or high-contrast lettering. The addition of high-contrast stickers allows pupils, in the early days of keyboard familiarity, to check their fingering without peering at the keyboard and adopting bad posture.

The behaviour of the keyboard can also be adapted to prevent key repeats, enable pupils with the use of only one hand to manage multiple key strokes and produce sounds after certain key presses. (See **Unit B - Organizing your resources** for more information.)

Use of the keyboard may also be an effective replacement for mouse clicks. Even after adaptations to the pointer and display, many pupils find location of screen icons etc very difficult. Rather than moving the mouse pointer to the printer icon, for example, preference should be given to learning the appropriate key stroke combination. In pull-down menus of applications an underlined character gives reference to the alternative key strokes; more obscure references are available at the Microsoft Web site:

[www.microsoft.com/enable/products/keyboard.htm](http://www.microsoft.com/enable/products/keyboard.htm)

Initially the addition of an overlay on an overlay keyboard, with a tactile or enlarged image may help navigation.

### **Example 3g - Ewan**

Ewan has hemianopia which results in a loss of his right visual field. Despite adaptations to the pointer and display, Ewan is often unable to locate the pointer if it is situated outside his visual field, at the right side of the screen. He spends a lot of time trying to locate the pointer to click on icons. His teacher felt that despite his ability to see fine detail, it would be more appropriate for Ewan to use key strokes or short cut keys for functions such as *open*, *save* and *print*. Rather than introducing too many commands at a time, Ewan will learn them as he needs to carry out a function.

#### **Key skills and equipment**

The key skills for the above example are the ability to:

- introduce key strokes as appropriate to replace the need for positional mouse clicks
- know all corresponding key strokes for positional mouse click operations

The key equipment is:

- no additional equipment; all applications should have corresponding key strokes

## Conclusion

Where appropriate and effective technology is integrated into the learning environment of a pupil with a visual impairment, it can:

- challenge and enhance traditional teaching methods
- be tailored specifically to individual learning styles and physical or sensory needs
- use a variety of input / output methods
- accommodate the pupil's sensory, cognitive and physical abilities

The benefits of technology can best be realized when careful consideration is given to:

- the visual, cognitive and physical abilities of the learner
- the capabilities offered by the technology
- the mechanisms to support and develop staff competencies

ICT will be most effective when seen as an enrichment to the learning environment, rather than when considered in isolation. Similarly, enabling technology for visually impaired learners should be seen as augmenting the ICT used by all pupils rather than specialist systems used in a separate context.

## Practical teaching activities

Please choose and complete one or more of the following activities:

### 1. The pupil's needs

Before embarking upon a decision to implement a particular device or application, it is necessary to determine the child's needs within the learning environment. Identify a child you support and outline areas for consideration when trying to assess the most appropriate technology solution for a particular curriculum demand.

### 2. Strategies

Describe a pupil in your school who has developed visual perception skills through the use of technology. Outline the strategies and resources used and how the development was monitored and evaluated. How has this enhanced development of a particular curriculum area?

### 3. Environmental considerations

A number of factors are important in relation to environmental considerations when implementing technology for pupils with a visual impairment. Describe the factors, which may influence effective use of resources within the classroom.

### 4. Curriculum resources

Design and produce a keyboard overlay or on-screen grid to develop a particular curriculum area, such as an historical topic, studied by the whole class. How can the overlay or grid be adapted and enhanced to suit the needs of more than one pupil in the class?

### 5. Overlays

Describe the use of an overlay keyboard and tactile overlays to develop literacy and tactile discrimination skills with a pupil who has no useful vision.

### 6. Frameworks

There are many framework applications which can be used to develop touch screen activities to develop tracking and the use of functional vision in pupils with partial sight. Devise an age-appropriate activity with an application of your choice to support a particular curriculum requirement, such as a Maths activity.

### 7. Talking word processors

Many pupils with a visual impairment use talking word processors to introduce the concept of speech output and aid writing across the whole curriculum. Compare the facilities offered by two specific applications and evaluate their effectiveness when used by a pupil with: (a) partial sight, (b) no useful vision.

8. Developing reading

Describe the use of CD-ROMs or electronic books to develop literacy and encourage emergent literacy skills with a pupil who has partial sight.

9. CCTV

There are many different models of CCTV available. Identify a pupil who needs to use a CCTV to access print; outline the features needed and the practical considerations when installing the device in the learning area.

10. Working alongside peers

Technology has the flexibility to respond to the diverse physical and visual needs of a child to ensure they are able to access the curriculum. Describe how you are able to configure technology available to you, or resources produced, to allow pupils with a disability to work effectively alongside their peers, sharing an activity wherever appropriate.

## Appendix 1 - Supplier information

### Alphavision

[www.alphavision.co.uk](http://www.alphavision.co.uk)

Tel. 01872 870700

This company supply access technology including the ERGO range of CCTVs, the screen reader *Window-Eyes* and screen magnification software.

### Black Cat Educational Software

[www.blackcatsoftware.com](http://www.blackcatsoftware.com)

Tel. 0161 827 2927

Black Cat is a division of Granada Learning.

### Blazie Engineering

[www.blazie.co.uk](http://www.blazie.co.uk)

Tel. 020 8752 8650

This company specializes in products for Braille users. Products include Braille note-takers such as Braille 'n' Speak and Braille Lite, Braille embossers like Braille Blazer and Braille displays such as PowerBraille.

### Concept Systems

[www.conceptsystems.net](http://www.conceptsystems.net)

Tel. 0115 939 1391

This access technology supplier has the Clearview range of CCTVs and other products such as screen magnification packages.

### Crick Software

[www.cricksoft.com](http://www.cricksoft.com)

Tel. 01604 671691

This company produce software for special needs and are the producers of the award-winning product, *Clicker* - an on-screen keyboard with speech.

### Dolphin Computer Access Ltd

[www.dolphinuk.co.uk](http://www.dolphinuk.co.uk)

Tel. 01905 754577

This company produces access software for visually impaired users such as *Hal*, *Lunar*, *Supernova*, *Cicero* and *Cipher*. These products include screen readers, screen magnifiers, reader magnifiers and Braille translators.

### Don Johnston Special Needs

[www.donjohnston.com](http://www.donjohnston.com)

Tel. 01925 241642

This company produces software for special needs and are the suppliers of the talking word processor *Write:Outloud* which has a talking spelling checker.

### Flexible Software Ltd

[www.flexible.co.uk](http://www.flexible.co.uk)

Tel. 01865 391148

This company sells educational software for Primary and Secondary.

### Inclusive Technology Ltd

[www.inclusive.co.uk](http://www.inclusive.co.uk)

Tel. 01457 819790

This company supplies access technology hardware and software for education including Touch Monitors, overlay keyboard products, including IntelliKeys, and *Inclusive Writer*. They also offer a comprehensive list of special needs articles and information along with links to supporting information and organizations on their Web site.

### Logotron

[www.logo.com](http://www.logo.com)

Tel. 01223 425558

An educational software company who supply the talking word processor *Talking PenDown*.

### Modern World Data Ltd

[www.modern-world-data.com](http://www.modern-world-data.com)

Tel. 0151 650 6961

Suppliers of access technology including the Mountbatten Brailier and Pictures in a Flash (PIAF).

### Professional Vision Services

[www.professional-vision-services.co.uk](http://www.professional-vision-services.co.uk)

Tel. 01462 420751

PVS supply a range of access technology products including the Magnilink range of CCTVs, note-takers, screen magnification and speech output packages.

### Pulsedata International

[www.pulsedata.com](http://www.pulsedata.com)

Tel. 01933 626000

Pulsedata sells CCTVs, speech synthesizers and note-takers. Their products include the Smartview range of CCTVs.

### Queen Alexandra College

[www.qac.ac.uk](http://www.qac.ac.uk)

Tel. 0121 428 5050

QAC is a national residential and day college of further education for people aged 16 to 63 who are blind or partially sighted. It also supplies some access technology products including the Tactile Image Enhancer.

### RCEVH

[www.bham.ac.uk/RCEVH](http://www.bham.ac.uk/RCEVH)

Tel. 0121 414 6733

The Research Centre for the Education of the Visually Handicapped researches into education of the visually impaired and develops materials. They produce a publications list and a software catalogue of educational materials that can be used in the classroom. Their software includes *Soundbook*.

## **RESOURCE**

[www.resourcekt.co.uk](http://www.resourcekt.co.uk)

Tel. 01509 672222

RESOURCE is an educational software supplier and one of the suppliers of Touch Windows, the touch-sensitive screen that can be attached to the monitor.

## **Semerc**

[www.semERC.com](http://www.semERC.com)

Tel. 0161 827 2966

Semerc is a supplier of educational multimedia and software for those with special needs. They also supply Concept keyboards.

## **Sherston Software**

[www.sherston.co.uk](http://www.sherston.co.uk)

Tel. 01666 843200

Sherston supply educational software for all ages, including curriculum-based software and CD-ROM talking stories such as *Naughty Stories*.

## **Sight and Sound Technology**

[www.sightandsound.co.uk](http://www.sightandsound.co.uk)

Tel. 01604 798070

This company supplies access technology including CCTVs, screen magnification software like Zoomtext, speech synthesizers, Braille embossers, Braille translation software and the popular JAWS screen reading software.

## **Soundlinks Ltd**

[www.soundlinks.com](http://www.soundlinks.com)

Tel. 01494 794797

Soundlinks is a company that provides training in Internet use for those with a visual impairment. UK suppliers of the talking web browsers *PWwebspeak* and *IBM Home Page Reader*.

## **Techno-Vision Systems Ltd**

[www.techno-vision.co.uk](http://www.techno-vision.co.uk)

Tel. 01604 792777

This company supplies various access technology products including the Tactile Image Enhancer.

## **Telesensory**

[www.telesensory.com](http://www.telesensory.com)

Tel. 0208 205 3002

This company supplies products for those with low vision, e.g. the Aladdin range of video magnifiers.

## **Visualeyes**

[www.visualeyesonline.co.uk](http://www.visualeyesonline.co.uk)

Tel. 01422 846051

Visualeyes sell various products including Reinecker CCTVs, magnification software, scanners and the Hotspot Fuser Junior.

## **Widgit Software Ltd**

[www.widgit.com](http://www.widgit.com)

Tel. 01926 885303

Widget produces educational software to improve the literacy of pre-school, primary, special needs pupils and adults with learning difficulties. Software for those with a visual impairment includes *Inclusive Writer* and *Writing with Symbols*.

## **Zychem Ltd**

[www.zychem-ltd.co.uk](http://www.zychem-ltd.co.uk)

Tel. 01625 528811

Zychem sell the Zy-Fuse tactile image machine.

## Appendix 2 - Useful organizations

### **AbilityNet**

[www.abilitynet.co.uk](http://www.abilitynet.co.uk)

Tel. 0800 269 545

This charity provides impartial advice about computer technology for those with disabilities. They can also provide assessments.

### **ACE Centre, Oxford**

[www.ace-centre.org.uk](http://www.ace-centre.org.uk)

Tel. 01865 759800

These centres provide independent inter-disciplinary assessments, training, advice and information on the use of assistive technology, primarily for individuals communication impairments, although the needs of individuals with physical and / or communication impairments such as sensory impairment or learning difficulties are also considered. They also produce publications and software.

### **ACE Centre North, Oldham**

[www.ace-north.org.uk](http://www.ace-north.org.uk)

Tel. 0161 627 1358

### **Action for Blind People**

[www.afbp.org](http://www.afbp.org)

Tel. 020 7635 4900

Action for Blind People is a UK charity which aims to enable blind and partially sighted people to enjoy equal opportunities in every aspect of their lives.

### **American Council for the Blind**

[www.acb.org](http://www.acb.org)

The Council strives to improve the well being of all blind and visually impaired people by promoting greater understanding of blindness and the capabilities of blind people. Their Web site includes technology and information resources.

### **American Foundation for the Blind**

[www.afb.org](http://www.afb.org)

This organization is a leading resource in the US for people who are blind or visually impaired, the organizations that serve them and the general public. They have a comprehensive Web site that holds news, information and other resources, including two online journals.

### **British Educational Communications and Technology agency (Becta)**

[www.becta.org.uk](http://www.becta.org.uk)

Tel. 024 7641 6994

This organization promotes the use of new and existing technologies to enhance learning opportunities in all areas of education and training. Becta have been involved in many projects evaluating the use of computers and technology for use by those with special needs. These projects are undertaken by the inclusive education team, who research into these areas and produce reports, information sheets and publications.

### **British Computer Association for the Blind**

[www.bcab.org.uk](http://www.bcab.org.uk)

BCAB was formed to cover all aspects of computing and visual impairment. They produce a regular newsletter, have an electronic mailing list, run training courses and introductory workshops.

### **Disability Net**

[www.disabilitynet.co.uk](http://www.disabilitynet.co.uk)

Disability Net is one of the world's leading Internet based disability information and news service.

### **Electronic Aids for the Blind**

[www.eabnet.org.uk](http://www.eabnet.org.uk)

Tel. 020 8295 3636

This charity has a remit to enhance the independence of blind and visually impaired people through the provision of specialist or suitably adapted electronic equipment. They will raise funds for the purchase of equipment. Target groups are wide including, for example, pupils in mainstream education who have equipment provided by the LEA for use at school but require similar equipment at home for homework and effective study.

### **National Association for Special Educational Needs (NASEN)**

[www.nasen.org.uk](http://www.nasen.org.uk)

Tel. 01827 311500

Aims include the promotion of the development of pupils and young people with special educational needs and influencing the quality of provision for these pupils. Activities include advice and support, the provision of courses, conferences and the publication of two journals.

### **RNIB Technology Information Service**

[www.rnib.org.uk/technology/](http://www.rnib.org.uk/technology/)

Tel. 024 7636 9555

The Technology Information Service can provide information on the use of technology for the visually impaired, primarily in the areas of education and employment. Enquiries can be received via phone, email, fax and letter. They aim to help sighted and visually impaired people such as parents, employers, those in work or seeking work, pupils, teachers and educational and employment professionals. Fact sheets can be sent, information over the phone, referrals to other RNIB departments or to other external services and organizations.

### **Scottish Sensory Centre**

[www.ssc.mhie.ac.uk](http://www.ssc.mhie.ac.uk)

Tel. 0131 651 6501

The Scottish Sensory Centre is a UK-wide organization, which promotes and supports new developments and effective practices in the education of pupils and young people with sensory impairments, i.e. visual, hearing or dual sensory impairment. Their library has an extensive collection of books, videos and journals concerned with sensory impairment issues and education. They also have an online information service for the visually impaired community.

## Appendix 3 – Other resources and sources of information

### Journals

#### **Access World: Technology for Consumers with a Visual Impairment**

[www.afb.org](http://www.afb.org)

This online journal is written by the American Foundation for the Blind and contains interviews, information and reviews concerning technology and software for the visually impaired.

#### **British Journal of Special Education (BJSE)**

The BJSE aims to cover the whole range of learning difficulties and disabilities, both in special and mainstream schools. There is a regular computer page.

Blackwells Publishers, 108 Cowley Rd, Oxford, OX4 1JS Tel. 01865 791100

[www.blackwells.co.uk](http://www.blackwells.co.uk)

#### **British Journal of Visual Impairment (BJVI)**

This periodical covers all aspects of visual impairment. It is written for professionals who are concerned with pupils and adults who have a visual impairment. It is a national forum for all views on related subjects.

NASEN, Tel. 01827 311500

#### **Centre Software**

This quarterly RCEVH journal concentrates on visual impairment and computing with special emphasis on additional needs and technology.

Research Centre for the Education of the Visually Handicapped (RCEVH), University of Birmingham, School of Education, Edgbaston, Birmingham B15 2TT Tel. 0121 414 6733

[www.bham.ac.uk/RCEVH/welcome.htm](http://www.bham.ac.uk/RCEVH/welcome.htm)

#### **Educational Computing and Technology**

This journal specializes in computing for schools. It includes news, reviews and information on most aspects of educational computing. Published six times per year.

Hobsons Publishing, Bateman Street, Cambridge CB12 1LZ Tel. 01223 354551

#### **Eye Contact**

This journal focuses on the needs of pupils with impaired vision who have additional learning difficulties. It has news and other information for parents and professionals. It has technology features and is published termly.

RNIB Education Information Service, 224 Great Portland St, London, W1N 6AA Tel. 020 7388 1266

#### **Journal of Visual Impairment and Blindness**

[www.afb.org.uk](http://www.afb.org.uk)

This is an interdisciplinary journal for practitioners and researchers professionally concerned with blind and visually impaired persons. It provides a forum for wide ranging views and draws on many different disciplines in order to further work for visually impaired people. Published six times a year. Also available online.

The American Foundation for the Blind, 11 Penn Plaza, Suite 300, New York, NY 10001

#### **New Beacon**

A monthly magazine for people with a visual impairment and their families. It is also aimed at volunteers and professionals. It has news and views and articles on various subjects, including advances in technology.

Customer Services, RNIB, PO Box 173, Peterborough PE2 6WS Tel. 0845 702 3153

#### **Special Children**

This independent magazine focuses on pupils with special needs. It carries news, views and information with occasional special features on technology.

27 Fredrick St, Hockley, Birmingham B1 3HH Tel. 0121 212 0919

#### **Visibility**

Visibility is for parents and professionals working with pupils and young people who attend a local school or college.

RNIB Education Information Service, 224 Great Portland St, London W1N 6AA Tel. 020 7388 1266

## Books, videos and other information

### **Access Technology: A guide to educational technology for visually impaired users**

This RNIB book is a guide to educational technology resources for visually impaired users. It describes Access Technology hardware and software to support visually impaired pupils and pupils in mainstream schools and colleges.

Customer Services, RNIB, PO Box 173, Peterborough PE2 6WS Tel. 0845 702 3153

### **Leading the Way**

This RNIB video complements the RNIB publication 'Access Technology'. It shows how ICT can benefit visually impaired pupils of all ages in a range of educational settings.

Customer Services, RNIB, PO Box 173, Peterborough PE2 6WS Tel. 0845 702 3153

### **A Vision Shared**

This RNIB video identifies aspects of good practice and strategies for successful inclusion of visually impaired pupils in mainstream education.

Customer Services, RNIB, PO Box 173, Peterborough PE2 6WS Tel. 0845 702 3153

### **Web sites that work**

This video from RNIB and the Web Accessibility Initiative (WAI) shows how people with disabilities use the Internet. It also explains the WAI, which promotes access to the Internet for all by encouraging Web site creators to think about accessibility issues whilst designing a site.

For a copy contact Julie Howell, RNIB, 224 Great Portland St, London, W1N 6AA Tel. 020 7391 2191

### **Models of mainstreaming for visually impaired pupils**

HMSO, Dawkins, J ISBN 0-11-701556-3

This book looks at studies of local education authority services and blind and partially sighted pupils and examines the issues that need to be tackled by educators of visually impaired pupils.

Customer Services, RNIB, PO Box 173, Peterborough PE2 6WS Tel. 0845 702 3153

### **Supporting pupils with a visual impairment in mainstream schools**

RNIB ISBN: 0 7496 1746 2

This book explains everything from medical causes to social and educational effects of visual impairment. It offers suggestions on how to teach and integrate the pupils into the class and discusses specialist equipment.

Customer Services, RNIB, PO Box 173, Peterborough PE2 6WS Tel. 0845 702 3153

### **Communication and access to computer technology**

This book covers computer technology with reference to special needs and there is a chapter on Visual Impairment: computing equipment and access to computers.

Disability Information Trust, Mary Marlborough Centre, Nuffield Orthopaedic Centre, Headington, Oxford OX3 7LD Tel. 01865 227592

### **Visual Impairment and IT**

[www.becta.org.uk/technology/info-sheets/sen.html](http://www.becta.org.uk/technology/info-sheets/sen.html)

This information sheet explains how IT can help those with a visual impairment. It also lists books, journals, Internet resources and organizations where further information can be found.

Available from Enquiry Desk, Becta, Milburn Hill Rd, Science Park, Coventry CV4 7JJ

Tel. 024 7641 6994 Fax. 024 7641 1418

### **RNIB Technology Factsheets**

[www.rnib.org.uk/technology/factsheets/factsheets.htm](http://www.rnib.org.uk/technology/factsheets/factsheets.htm)

The RNIB Technology Information Service produces a range of factsheets that look at most areas of technology of interest to those with a visual impairment. There is information for example about producing Braille, screen magnification software, speech output software, note-takers, video magnifiers and reading aids.

RNIB Technology in Learning and Employment, c / o Exhall Grange School, Wheelwright Lane, Coventry CV4 7JJ Tel. 024 7636 9555

## Appendix 4 - Some useful Web sites

### **Apple Disability Resources** - [www.qt-tv.net/education/k12/disability/](http://www.qt-tv.net/education/k12/disability/)

An Apple Mac site which explains the access software available for those with a Mac and highlights the support features which are built into a Mac to support those with a disability.

### **Center for Applied Special Technology (CAST)** - [www.cast.org](http://www.cast.org)

This organization supports the use of technology for those with disabilities to encourage access to learning for all. Their site includes information about teaching strategies, teaching tools, concepts, issues and initiatives.

### **Closing the Gap** - [www.closingthegap.com](http://www.closingthegap.com)

This US organization provides support materials on the Internet, in newspaper format and via an annual conference for using technology for those with special needs. The library includes many articles including those on curriculum development and inclusion.

### **Hands and Eyes Newsletter** - [home.earthlink.net/~vharris/](http://home.earthlink.net/~vharris/)

This online newsletter includes ready-to-use art and learning activities for visually impaired pupils. These have been developed by a teacher for the visually impaired for use in an inclusive classroom.

### **Internet Resources for Special Children** - [www.irsc.org/blind.htm](http://www.irsc.org/blind.htm)

The parent of a pupil with multiple disabilities developed this Web site. It is a resource with information and links to other Web sites of interest in the area of special needs.

### **Microsoft Enable** - [www.microsoft.com/enable/](http://www.microsoft.com/enable/)

This site includes descriptions of accessibility features in Microsoft operating systems and applications. There is also a catalogue of accessibility aids designed for Windows operating systems.

### **The National Center to Improve Practice (NCIP)** - [www2.edc.org/NCIP/](http://www2.edc.org/NCIP/)

The National Center to Improve Practice (NCIP) in Special Education through Technology, Media and Materials holds information about educating a visually impaired child, and pupils with other special needs, in mainstream education.

### **National Grid for Learning** - [www.ngfl.gov.uk](http://www.ngfl.gov.uk)

This is a collection of resources brought together by the UK Government to help raise standards in education and support life-long learning. There is a section for special needs resources.

### **RNIB Accessing Technology Web site** - [www.rnib.org.uk/technology/](http://www.rnib.org.uk/technology/)

This technology Web site contains information for blind and partially sighted people who are using or would like to use technology in employment, at study and for leisure. There is also information about the Technology Information Service and the Technology factsheets are available here.

### **RNIB Curriculum Clipboard** - [www.rnib.org.uk/curriculum/welcome.htm](http://www.rnib.org.uk/curriculum/welcome.htm)

This site offers information and advice to all professionals supporting a visually impaired pupil accessing the Curriculum. It also contains regularly updated news and information and VI qualified subject specialists are available to answer questions.

### **Sensory Information Service** - [www.ssc.mhie.ac.uk/Vpages/F4/V46.htm](http://www.ssc.mhie.ac.uk/Vpages/F4/V46.htm)

SIS is an information service designed for the deaf and visually impaired community. There is a large technology section.

### **Special Education Exchange** - [www.spedex.com](http://www.spedex.com)

This is a resource for educators, professionals, parents, consumers, pupils or anyone with an interest in special education.

### **Teaching Math to Visually Impaired Students** - [www.tsbvi.edu/math/](http://www.tsbvi.edu/math/)

This site gives examples of how a teacher can teach maths to a visually impaired pupil. It gives comprehensive information and examples of how to teach various aspects of mathematics from graphs to quadratic equations.

**Technology Guide to Assist Pupils with VI in meeting curriculum goals -**

[www.setbc.org/special/virg/](http://www.setbc.org/special/virg/)

This US guide looks at a framework for addressing a range of technology options for meeting general learning expectations for the visually impaired pupil in a mainstream classroom. Outcomes in reading, writing and maths are concentrated on.

**V I Guide - [www.viguide.com](http://www.viguide.com)**

This site is a guide to Internet resources about visual impairments for parents and teachers. It has pointers to other Web sites concerned with Access Technology, services, organizations, research, education and leisure.

**BLIND-L - <mailto:listserv@listserv.uark.edu>**

BLIND-L is an email discussion group that discusses issues about visually impaired people using computer. Hints and tips on using Access Technology may be found here. See

[listserv.uark.edu/archives/blind-l.html](http://listserv.uark.edu/archives/blind-l.html) for information on how to subscribe.

**[news:alt.comp.blind-users](mailto:alt.comp.blind-users)**

This is an Internet newsgroup dedicated discussion of computer technologies for blind and visually impaired users. Consult your Internet provider for information on configuring newsgroup software.

## Appendix 5 - Additional resource information

Please note that this is not an exhaustive list as it contains only some of the software available. It is important to discover the individual requirements of a pupil with a needs assessment before purchasing any software.

### Screen magnification systems

Magnification system	Operating system	Supplier	Price (approx)
Lunar for Windows	Windows 95 / 98 / ME Windows NT / 2000	Dolphin Concept Systems AbilityNet	£175 £375
MAGic	Windows 95 / 98 Windows NT / 2000	Sight and Sound	£260 £375
Zoomtext Xtra	Windows 95 / 98 / ME Windows NT / 2000	Sight and Sound Pulsedata RNIB	Level 1 £310 Level 2 £430
inLarge	Apple MacOS	Don Johnston	£295

### Cursor enhancement

Application	Operating system	Supplier	Price (approx)
Biggy	MacOS Windows 95	Don Johnston	£69
ToggleMouse	Windows 95 / 98 / NT	Toggle Software <a href="http://www.toggle.com">www.toggle.com</a>	\$19.95 (free 30 day trial)
Meta-Mouse	Windows 95 / 98	Cyclex <a href="http://www.cylexinc.com/mmou.htm">www.cylexinc.com/mmou.htm</a>	\$21 (free 30 day trial)
IntelliPoint	Windows 95 / 98 / NT MacOS	Microsoft <a href="http://www.microsoft.com/products/hardware/mouse/driver/default.htm">www.microsoft.com/products/hardware/mouse/driver/default.htm</a>	free
Lupe	MacOS	ARTIS Software <a href="http://www.artissoftware.com">www.artissoftware.com</a>	free

## Overlay keyboards

Board	Size	Platforms	Supplier	Price (approx)
IntelliKeys	A4+	PC Macintosh	Inclusive Technology Ltd	£279
Concept Universal Plus	A4 A3	PC Macintosh Acorn	Semerc	£129
Concept Universal Plus Infra-red	A3 A4	PC Macintosh Acorn	Semerc	£159
Informatrix	A3	PC Acorn	Semerc	£149

## Tactile image machines

Fuser	Supplier	Features	Price (approx)
Zy-Fuse	Zychem Ltd	Manual temperature adjustment A3-A4	£495
Tactile Image Enhancer	Queen Alexandra College Techno-Vision Systems	Manual temperature adjustment A4-A3	£695
Hotspot Fuser Junior	Visualeyes	Manual Temperature adjustment A4-A3	£350
Pictures in a Flash (PIAF)	Modern World Data	A4-A3	£650



