Allied Health Professions Support Service
Factsheet 3: Assistive Technology and Low Tech Equipment

Allied Health Professions Support Service: supporting disabled student and qualified allied health professionals in educational and employment settings throughout the UK

Factsheet 3: Assistive Technology and Low Tech Equipment

N.B. This document covers a wide range of technology and equipment but the list is not exhaustive. Individuals may already be aware of other equipment which could be helpful in study or employment settings.

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Access Technology

Introduction

The term 'access technology' is used here in its widest sense i.e. technological equipment that can help a disabled person to access the educational and/or work environment. The technology can be used to improve access in a number of ways:

- To make teaching and learning materials more accessible
- To produce materials in a range of accessible formats
- As an alternative means of producing and accessing text
- To improve independent access to information, particularly electronic information

Technology can be a key factor for disabled students; enabling access to many courses. It is not, however, the solution for all barriers they may encounter. You must provide materials in appropriate formats. Just because students might have some technological equipment, you must not expect them to be responsible for dealing with all the access issues related to teaching and learning materials.
Your institution should provide technology in the library or learning resource centre so that disabled students can access materials independently. Some types of access technology may be provided on your university computer network to enable students to use email, virtual learning environments (VLEs) and the internet.

Once equipment and systems are in place, details about them should be included in university information and marketing materials. You should know what is available and should ensure that all of your teaching and learning materials are accessible. This information should be well publicised to students.

When considering the financial implications of installing access technology, some money will be needed to provide staff training and to allow for maintenance of equipment. There is no point having equipment and assistive software in place if you can't use it.

**Assessment**

Students should be offered an assessment for a Disabled Students Allowance (DSA). If possible, the student should have the option to see and test out a variety of available equipment. This will help to ensure that the equipment recommended meets individual and course requirements. There is fairly strict guidance about what equipment can be paid for by the DSA. The DSA assessors must abide by the guidelines and it is possible that all their recommendations may not be agreed by the financial authorities.

Relevant factors might be:
- What does the student require to access the curriculum?
- Can the technology be used in both academic and clinical settings?
- Which input, storage and output features are the best match for the student’s requirements/abilities?
- Which equipment offers these features?
- Will the student need training (initial/ongoing)?
- How will using the technology affect the student's work and study strategies?
- Will the use of new equipment/software change the level/ nature of other support that the student might be receiving?
- What level of technical support (if any) will be necessary?

**Technical support**

Equipment can sometimes go wrong, or, after some experience, the student may wish to change the set-up. If the technology is vital for the student's participation in the programme, technical help must be available. It is possible for modifications to be made to the initial DSA assessment if changes are required.

**Computers**
Much access equipment is computer (personal computer – PC) related. The apparently exponential rate of development has made a great contribution to the accessibility of material for disabled users.

- Desktop - usually sited at the student's home or hall of residence; used for producing written work and for accessing text.
- Laptop – portable so can be used at home and in university and clinical settings (possibly).
- Tablet - extremely portable and increasingly popular

Manufacturers are becoming more aware of disability issues and are working with developers of access systems for disabled users, e.g. the iPad and some android technologies have built in magnification facilities and text to speech.

**Accessories**

**Monitors**

Desktop computers usually have monitors included in the price. These are high-quality/high contrast colour screens of various sizes. Some students might use larger monitors as these can negate the need for screen magnification software.

**Printers**

Printers may be included in students' DSA recommendations. This allows them to produce text in their preferred hard copy format.

**Scanners**

Text based information can be captured and stored by using a scanner and optical character recognition (OCR) software. It can then be accessed by the student using the preferred format e.g. text magnification, alteration of foreground/background colours, speech output or Braille display.

**Enlargement systems**

Enlarged text and diagrams can be presented in a number of ways. These may be useful to partially sighted students and those who have dyslexia.

**Paper based**

Probably the least technical way to provide enlargement of standard print or diagrams is by the use of a photocopier. A4 material can be enlarged to A3. The disadvantages of this method lie in unwieldy paper size, poor contrast/quality and insufficient enlargement of text.

Alternatively, a larger font size can be used when printing a document on A4 paper. This is preferable because it keeps paper size manageable and the font size can be tailored to student requirements.
Closed Circuit Television (CCTV)/Video Magnifiers

These are specifically designed for visually impaired readers and many find them valuable for both reading and handwriting text. Pictures, text and solid objects can be placed under the camera and a magnified image appears on the monitor. Magnification up to x75 is possible. The student should practice using a CCTV to become proficient.

There are a number of different varieties:

- Desk top: non-portable designs. These usually have a built-in camera and a moveable X-Y reading table that allows the position of the book or object to be changed easily. All provide options of colour/black and white. Foreground and background colours can be switched as can polarity (i.e. dark text on light background or light text on dark background) depending on user preference.

- Portable CCTVs/Video Magnifiers: these are hand-held and many have the same facilities for colour/polarity change as the desk top versions. Some can capture an image for later viewing. These can be useful in the practice based setting. Visually impaired travellers may use them to identify street signs and information on departure boards and bus stops. The small screen limits the amount of visible text and so can affect how quickly information can be read.

- 3-in-1 video magnifiers: These are usually portable and can be linked to a laptop computer. The camera can be used as a CCTV in order to view, magnify and save text to a computer or to view and magnify distant objects.

- Auto-readers: these are mains operated, low vision, autofocus, full colour, readers which scan, capture and enlarge the entire page for reading. Readers can choose to display a column layout (wrapped paragraph), row layout (continuous line) or word layout (one word at a time). Text can be scrolled automatically at a selected speed or this can be done manually a screen at a time.

Some CCTVs have an option of changing the display to over and underline on screen to assist reading along lines of text or accessing mathematical or other figure-based data such as spreadsheets. Many also allow blacking out of the screen outside these lines to help the user to concentrate on the relevant area of the text. Some also have the facility to be linked to a PC. By using the ‘split screen’ facility, the user can create and access written information simultaneously.

Screen magnification systems

This software can magnify the text, menus and icons on the computer screen up to 32 times. Screen magnification software increases the size of the image displayed on the screen, so only a portion of the original screen image can be seen at one time. Because of this, a large monitor is often used to increase the screen’s viewable area. Normally the magnification will automatically follow the area of attention, for example the cursor.
These systems offer the facility to change the colour of text and background and the polarity (i.e dark on light or light on dark).

When purchasing screen magnification systems, institutions should look for those that can be loaded on to any existing network.

**Speech systems**

**Speech Output software or Screen Reader software**

A screen reading programme (such as Jaws) sends text displayed on the screen to be spoken by a speech synthesizer. Common features include the ability to speak the full screen, a user defined area of the screen, a line, a word, individual letters or the phonetic equivalent of a letter and punctuation. A screen reader allows menus, dialog boxes, tool tips and system messages to be read back.

Some screen enlargement systems (such as ZoomText Xtra and SuperNova) feature fully synchronized magnification and screen reading systems.

Systems such as Read and Write Standard text to speech software provides extensive tools including speech feedback, phonetic spell checking and homophone checking to help people who have dyslexia.

NB: Magnification and Screen reading software are becoming increasingly available on mainstream equipment such as Smartphones, other mobile phones and Blackberries.

**Reading pens**

These can be used to scan and insert text using the touch screen and virtual keyboard. Text can be spoken aloud and definitions and correct pronunciation provided. Words which have been looked up can be transferred to the PC for further practice. Text can also be uploaded from the PC to be read aloud wherever the user is studying/working.

**Hand held portable readers**

These can be used by people who have visual impairments or those who have reading-based learning disabilities. They provide access to a variety of printed materials. They combine a high-resolution camera with a built in processor that converts printed text to digital text and then reads it aloud.

Larger documents can be captured by a ‘bulk capture station’ (usually sold separately to the reader) and this text can then be accessed anywhere using the reader.
Electronic spellcheckers and phonic dictionaries

Various electronic dictionaries and thesauruses are available which have speech capability. The built-in speech function allows the user to hear the spelling suggestion, headwords and definitions making it easier to find the right word.

Recording

This method is widely used by both disabled and non-disabled students and can be a useful addition to study methods. A disadvantage is that it is slower than reading text. Encourage students to use this method as an adjunct to taking notes and not as a replacement otherwise they may end up listening to all their lectures twice which is an inefficient use of study time.

Most students use digital voice recorders which can be linked to computers to download audio files.

Audio labelling equipment

An example of this is the PenFriend produced by RNIB. This portable equipment can be used to record and re-record information onto self-adhesive labels. The recordings can be played back anywhere by using the PenFriend - no computer is required. It can also be used as a portable note taker or personal organiser: a message is recorded and the allocated label can be placed in a small notebook or diary. The PenFriend can be used at home, in the university or practice based setting for:

- labelling equipment
- labelling resources
- organising coursework
- organising work and study diaries/timetables

Stand-alone Reading Machine

This comprises one unit that integrates a scanner, Optical Character Recognition (OCR) Software and speech software. The printed document can be scanned and read by the same machine. Some allow document storage and have USB ports to enable download/transfer of material.

Digital book players

These are portable pieces of equipment which can be used to either download available books and MP3 files or to play DAISY (Digital Accessible Information System) books which can then be accessed using speech. They provide excellent navigation features and incorporate an integrated microphone to make voice notes.

Some equipment is designed more specifically for use by people who have dyslexia. For example the ClassMate Reader reads aloud and simultaneously displays and
highlights text on a full colour screen. It also includes study tools to enhance learning such as bookmarks, voice recording, highlighting function and a speaking dictionary. Students can download and store their curriculum directly on an SD card for easy access. It has a touch screen and a user friendly interface. The multimodal approach including visual, auditory and touch methods of accessing text can enhance understanding.

Electronic Book Readers

Electronic Book Readers (E-Book Readers) are becoming increasingly popular amongst all students as a means of accessing text electronically. The iPad, the Kindle range and equipment produced by Sony offer varying levels of print and speech accessibility and many people who have low vision or dyslexia are choosing to use them.

Optical Character Recognition (OCR) software

This software is used in conjunction with a PC and scanner to capture and transfer printed text to the computer. Text is held electronically so it can be read by a screen reader or magnified with software. Mainstream OCR software is available that just copies the text.

Voice recognition (VR)

Voice recognition allows control of a computer by the use of voice; information can also be entered on to the computer by the same method. All VR systems need training and become more reliable and accurate over time. The user requires training with the system and the system has to be trained to the user's voice. Consistency of the voice is essential if good results are to be obtained.

This is a possible solution for people who have difficulty with their hands or who have dyslexia. Blind or partially sighted users should additionally be encouraged to perfect keyboard skills.

Talking Global Positioning Systems (GPS)

This portable equipment verbally announces names of streets, intersections and landmarks as the person walks. Users can pinpoint where they are, learn about area attractions and find out how to get to specific destinations. Some provide features for route planning and recording.

Braille systems

Braille displays

Electronic braille displays (such as the Brailliant) are tactile devices. They can be placed in front of a desktop or laptop keyboard and can also be used to access and input to mobile devices such as Smartphones/iPhones. They enable users to read the contents of the screen using braille cell technology. Each cell has eight pins which are electronically controlled to display a braille version of characters that
appear on the computer screen. The two lowest dots represent the position of the cursor.

Connectivity is via USB and Bluetooth. Braille displays allow precise navigation and are compatible with Windows computers and screen readers (such as Jaws and Window Eyes).

**Braille production**

Braille can be produced in hard copy on an embosser that prints Braille output from a computer. The embosser is connected to a computer or note taker in the same way as a conventional printer but produces the Braille by punching dots onto paper. Before the text can be embossed it has to be converted into Braille format by translation software.

**Braille note takers**

These portable devices are available, either with a QWERTY or Braille keyboard. Speech feedback allows the user to take notes, make appointments and many are now email and internet enabled. Some equipment offers an integrated Braille display which is essential for people who are regular Braille users and whose preference is to read, as well as hear, the text.

**Other software**

**Mind mapping tools**

These can be used to assist in the development of ideas while planning and structuring workflow. People who have dyslexia may find these useful as they help with organisational skills. Interactive diagrams, charts and reports assist in the organisation and prioritisation of concepts and information. They can be used in the classroom or in the work place for making notes, understanding concepts and drafting essays, reports or presentations.

**Note taking software**

This type of software can analyse audio files and identify the natural pauses that occur in speech. The audio is presented as a visual bar, broken at each pause in the recorded speech. This enables the listener to visualise the different sections of the speech or lecture. Recordings or audio files can be imported into the computer and the software is used to navigate through the recording using simple keyboard commands or the mouse. This can be personalised to suit user preferences e.g. font or colour options. The recording can be edited by breaking it down into smaller sections, or using simple cut, copy and paste commands.

Recordings can be annotated using colour highlighters or markers. Notes can then be exported to a word processor or mind-mapping tool, or edited tracks can be exported to listen to on an MP3 player or CD.
Tags and the search tool can be used to locate the information when needed.

**Medical dictionaries and spellcheckers**

These are widely available pieces of software which may be of use to those students who find new terminology difficult to spell and understand. A helpful feature of some is the comparison of UK and US spellings.

**Real time text software**

Text telephony is specifically meant to be the text equivalent to voice conversation for deaf, hard of hearing and speech-impaired people. To make it an equivalent of what voice is for hearing people, text telephony must offer equivalent features in terms of conversationality as voice does to hearing people.

It offers a character-by-character based interaction so that everything that is typed will appear immediately on the screen at the other end and vice versa. This means that text telephony is more equivalent to what voice is for hearing people than other types of message based systems such as SMS, MMS or email. TalkbyText is produced by Action on Hearing Loss.

**Alt-format software**

Dolphin’s EasyConverter can create large print, MP3, DAISY and Braille versions of learning materials. These can either be scanned from paper, or input from Word, PDF, HTML, Nimas, Kesi, DAISY XML, text or image files.

EasyProducer converts standard Word files into DAISY digital talking books (synchronised audio and text) that can be searched and navigated.

**Digital talking book players**

These are available either as desktop or portable equipment or as computer software. In general, desktop or portable players are used for pleasure listening and do not allow the user to access visual images. Students may prefer to use talking book software, eg. EasyReader. Users can read and listen to content through a combination of text, speech and images. They can navigate quickly to any section of a book, change the reading voice, customise their preferred text, background and highlight colours, search for words and phrases and place bookmarks in a book to highlight areas of interest.

**Other technical equipment**

**Amplified stethoscopes**

There are not many amplified stethoscopes on the market. The Top Phono E-steth has, however, been recommended by some hard of hearing users. It is a digital stethoscope that tunes in selectively to cardiac and pulmonary sounds. An adjunct to this is CardioMail which allows visuals of heart and lung signals to be shown on a computer screen. The files of these visual images and sounds can be viewed,
printed, faxed or e-mailed, permitting an objective aide in diagnosis by specialists in another location.

This stethoscope can be used by hard of hearing practitioners whilst wearing a special headset that fits outside the ears. This is ideal for those wearing hearing aids.

**Equipment for people who have physical impairments**

- **Keyboards** with larger keys to aid with precision
- **Keyguards** – a sheet of plastic or metal that fits across the top of the keyboard to help to steady the hand. These can aid stamina and increase accuracy
- **Trackballs/Joysticks** – alternative pointing devices that stay in a static location on the desk and do not require to be held whilst operating
- **Switches** – by pressing switches with any part of the body a user can make ‘choices’ on the screen; an example could be a copy of the keyboard on the screen where the user presses the switch to choose which letter they wish to type

**Low tech equipment**

Whilst many disabled students use a wide range of ‘hi-tech’ equipment (as described above), a significant proportion of them also rely on a variety of ‘low tech’ equipment for access to information and/or production of text.

Much of the ‘low tech’ equipment is designed for use by people who have visual impairments (see Low vision equipment below). Some commercially available equipment may be of use to students who have a range of impairments.

**Low vision equipment**

In general, people who use lens-based low vision equipment choose to undergo an assessment of vision prior to selecting particular items. This ensures that an appropriate appliance is issued with the correct lens prescription. Several items of lens-based low vision equipment are also available commercially, however, and many disabled customers purchase these independently. Examples of low vision equipment include:

- Glasses (monofocal/bifocal: with/without tinted lenses)
- Contact lenses (soft/hard)
- Optical low vision aids:
  - Simple hand magnifiers of varying sizes: with/without light
  - Stand magnifiers (fixed and variable focus)
  - Spectacle microscopes and telescopes: with/without light

**Other commercially available equipment**

- Pre recorded DVDs (e.g. for study of anatomy)
- Task lighting (angled lamps; spotlights; torches; book lights)
- Reading stands (desk/portable)
- A range of writing materials (markers; felt-tip pens; highlight text markers)
- Coloured/heavy lined paper
- Reading and writing guides
- Coloured acetate overlays
- Flashcards
- Dictionaries
- Diaries/personal organizers
- Keyboard stickers
- Textbooks with CD ROM/internet links
- E-books

**More specifically for people who have visual impairments**

- Braille writing equipment (available from RNIB)
- Labelling materials:
  - Coloured/tactile/shaped labels/buttons e.g. ‘Bumpons’ and ‘Loc Dots’
  - Magnetic labelling sheets or strips – paper or rubber with magnetic backing (these can be written on or brailled and then attached to metal objects as labels)
  - Tacti-Mark; fluorescent orange, black or white liquid plastic that sets hard. For marking equipment or for use as a teaching aid. The bottle nozzle has a fine point which is good for accurate marking (available from RNIB)
  - Tactile tape measure (available from RNIB)
  - Tactile goniometer (available from Allied Health Professions Support Service)

**Contact Us**

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Acknowledgment

The Allied Health Professions Support Service (AHPSS) was launched in 1991 in response to the closure of the Royal National Institute for Blind People's (RNIB) School of Physiotherapy which catered exclusively for visually impaired students. AHPSS's remit was to provide support to disabled allied health profession students in mainstream higher education in the UK. It also offered information, advice and specialised disability awareness training to academic and practice-based staff.

In 2002, AHPSS staff were invited by the Chartered Society of Physiotherapy (CSP) to join a team of specialists to produce a training manual specifically designed to provide guidance for practice based staff in supporting disabled students on practice based placements. The document: "Supporting Physiotherapy Students on Clinical Placement", was published in 2004 and received very positive feedback from all stakeholders.

By 2007, it was evident that the document needed updating in response to UK legislative and technological changes and the increasing use of online information. Following discussions with CSP staff, it was agreed that the AHPSS team (Jane Owen Hutchinson, AHPSS Manager and Karen Atkinson, Senior Lecturer and Manager of the RNIB Resource Centre at the University of East London), would take on this project.

Between 2007 and 2010, considerable time was spent in obtaining feedback from a wide range of stakeholders regarding the content and format of the future document. Whist it was unanimously agreed that it should be available in both hard copy and electronically, all staff identified the importance of being able to access some of the specific guidance on disability management from the AHPSS website.

"Into Physiotherapy" was published by the CSP and RNIB in 2010. Thirteen related information sheets were subsequently uploaded onto the AHPSS website (between 2010 and 2013), at which point the AHPSS was decommissioned by NHS London. As a result of the positive feedback these fact sheets received and requests from a number of organisations, Jane Owen Hutchinson and Karen Atkinson have given permission for these materials to continue to be available online.