

Reasonable adjustments: the practicalities

Duncan Abbott explains how assistive technology can improve “accessibility” of computer systems and physical workplaces.

In contrast to race and sex discrimination legislation, the Disability Discrimination Act requires employers to positively discriminate in favour of employees (and prospective employees) with disabilities. Recent articles in this journal¹ have explained the extent of this duty in legal terms.

The case of *Archibald v Fife*² was cited to reinforce the point about positive discrimination.

More recently, the Court of Appeal decision in *Williams v JWT*³ provided further illustration of the vulnerability of employers that fail to understand the extent of the duty to make so-called “reasonable adjustments”. In this case, a partially sighted employee was recruited without proper consideration for this requirement and the employer was ordered to pay a significant compensation award.

“Adjustments” include alteration to the physical features of the workplace and/or to working arrangements to accommodate those with restricted mobility, sensory or cognitive capacities.

Diversity officers, occupational health and human resources professionals are becoming aware that devices and technologies – known collectively as assistive/adaptive technology (AT) – have become available in recent years with the potential to provide practical solutions in such situations.

The term “AT” refers generally to equipment used to maintain or improve the functional ability of individuals with disabling conditions. In many cases it refers to hardware or software that facilitates computer use, such as through non-standard input or output devices.

Selecting a suitable solution, however, may be a complex and time-consuming operation since there are more than 26,000 AT devices available. For AT to be effective, it must not only address the needs of the individual with the disability and those of co-workers, it must be compatible with existing workplace equipment and not disrupt existing work arrangements. The occupational health professional should cooperate with other specialists, such as ergonomists, to examine possible solutions.

Visual impairments

Between one and two million people in the UK are blind or partially sighted – an estimated one in seven people aged over 60. Although visual impairment is considered by many experts as the toughest workplace challenge, there are several AT solutions available that can allow blind or visually impaired workers to be accommodated.

Screen readers

Many visually impaired individuals can access information shown on a computer screen by listening to it being spoken instead of reading the visual output displayed. The screen reader part of the system is software that allows the individual to specify which area of the screen should be entered into the speech synthesiser. Also referred to as a “text-to-speech” (TTS) facility, the speech synthesiser is a hardware device that converts computer code of the selected text into spoken output. (In shared office settings, the individual using such a device can wear headphones to ensure privacy and minimise disruption.) One of the most popular screen readers is Jobs Access With Speech (JAWS) for Windows⁴.

Screen enlargers

Screen enlargers (or screen magnifiers) work like a magnifying glass. They enlarge an area of the screen, increasing the legibility. A number also provide a split screen that allows the user to view the magnified and unmagnified page simultaneously. This means the user can see the general layout of the page in the non-magnified section and the detail in the magnified section. The SmartView video magnifier, by Pulse Data, is such a device. Designed for people with severely impaired vision, it allows the user to adjust the way in which the image appears to suit their eye condition; for example, background and text colour can be changed to colours that can be discerned by the user. The SmartView can help the visually impaired to read books, instructions, letters, statements, write cheques, and to view maps and plans.

Speech recognition software

Speech recognition systems, also called voice recognition programs⁵, allow people to give commands and enter data using their voices. These may also be used by people with language and learning disabilities who have difficulty typing or reading text.

Braille

Only 18,000 blind people in the UK are regular braille⁶ users and many who lose their vision later in life never learn to read braille or do not achieve a level of proficiency that would enable them to easily access information in this format. Also, some medical conditions make it difficult to discriminate between the braille dots. There are also several types of braille in use, depending on the subject matter being discussed.

Some users may be proficient in one of the braille codes but not others.

Braille input devices

Some users may prefer to use braille for computer input. This can be achieved by using a braille note taker, which includes a special keyboard comprising six keys and a space bar. The information can be reviewed by speech output via a synthesiser, to a braille printer or to a file for editing on the PC. There are also software packages available that will configure a PC keyboard so that it can be used for braille input.

Refreshable braille displays

Refreshable braille displays provide tactile output of information represented on the computer screen. The displays mechanically lift small rounded pins to form braille characters. Users read the braille letters with their fingers before refreshing the display to read the next line. Braille embossers transfer computer-generated text into embossed braille output.

Optical character recognition

Many visually impaired individuals benefit from the use of optical character recognition (OCR) to convert printed documents into a format accessible to them. Some OCR systems convert print directly into speech and in other cases the copy is converted into a PC file that can be read using a screen reader and speech synthesiser package.

Hardware solutions

Not all workers with a visual disability require AT. A worker with the first stages of glaucoma, for example, may benefit from a flat screen on a monitor arm. This allows the screen to be brought closer to the user and for it to be angled to get the best position for viewing. (Such mechanical devices ("assisted living products") are not termed AT since neither electronics nor software are involved.)

Hearing loss

The Royal National Institute for the Deaf estimates that 8.7 million people in the UK are deaf or hard of hearing, of which 50,000 use British Sign Language. There are AT products available that can convert the spoken word into sign language, text or images. They include adapted

Box 1: Visual impairment and physical disability overcome using assistive technology

John was unable to read from his computer screen because the program in use did not allow the font size to be increased. It was recommended that he should use Zoomtext (from www.aisquared.com), which enabled him to increase the font, although a larger monitor (21 inches) had to be fitted. Further problems arose because of the need for him to read hand-written documents. These problems were resolved with the use of a split-screen CCTV combination, which enabled him to read printed materials and perform data input.

telephones, captioned TV, voice-controlled computer input, writing aids and speech output devices.

Telephone receiver amplification

Several methods exist to amplify speech received via telephone handsets. Different devices are designed for those that wear a hearing aid and for those that do not. The standard telephone handset can be replaced with an amplification device with volume adjustment.

Text telephones

Where hearing impairment is too great to be compensated by a telephone amplification device, text telephones, which display a line of text in place of an auditory signal, may be used. There is a broad range of telephone devices for the deaf (TDDs) available.

Personal computer/TDD compatibility

Personal computers can also be configured to function as TDDs by adding a PC/TDD modem that supports PC/TDD code (ASCII). Incoming calls are indicated on the screen or, in some cases, a computer will automatically switch the user to TDD communication mode.

Speech amplification

There are several different amplification devices that can be used by hard-of-hearing individuals in meeting or conference settings. Different devices or settings are used for face-to-face meetings as opposed to meetings where several people are in conversation or discussion.

Many hard-of-hearing individuals can hear on a one-to-one basis, provided the speaker is face-to-face and remains visible all the time. In the group/meeting setting, however, an amplification device is invariably required. This uses a receiver with a neck loop or headset, depending on whether a hearing aid is being used.

Learning difficulties and dyslexia

Cognitive impairments are less well understood than mobility or sensory ones. Some technologies developed

Box 2: Multiple interventions for the hard-of-hearing

Multiple AT interventions were required for David, who had a hearing impairment and wore a hearing aid. He worked in an open-plan office and relied on a built-in telephone amplifier which was distracting co-workers. His phone was adjusted through use of an inductive coupler, which enabled the incoming signal to be picked up via his hearing aid. David's work also required him to use phones away from his desk and out of the office. An amplification device was provided for the in-house situation. When away from his workplace, David used a mobile phone with a portable loop to amplify speech and a vibrating alert for incoming calls. David also experienced difficulty in hearing all speakers during meetings. This was resolved through use of a suitable radio loop system, comprising a transmitter that could be connected to a conference microphone. The signal is transmitted to a receiver worn round the neck and can then be input via a hearing aid.

for other applications have been found to be useful for people with learning disabilities. OCR reading systems are a good example. They were developed to enable persons who could not see text to be able to listen to it. This technology has also proven to be effective in dealing with functional problems of persons with learning disabilities and there are many software programs available.

Word prediction software⁷ is one area where AT helps to alleviate cognitive impairments. This facility "guesses" the word an operator is beginning to type, offering a list of options in a window from which the operator can make a selection. These programs were originally designed to reduce the number of keystrokes required but, in the past few years, their use has been extended to individuals with learning difficulties, helping them to expand their vocabulary, for example.

Mobility and dexterity

Computer keyboard enhancements

A number of software packages are available that allow those with a mobility impairment to use a PC keyboard more easily; Windows includes standard features that can be found in the accessibility tools⁸. One that is frequently used is the on-screen keyboard program, providing an image of a standard (or modified) keyboard on the computer screen and allowing the user to select keys using a mouse, touch-screen, trackball, joystick, switch or electronic pointing device.

Alternative keyboards and mice

Keyboard ergonomics is critical for individuals with a mobility impairment. Small keyboards may work well for individuals with a limited functional use of one hand, for example. Ergonomic keyboards – of which there are many – have been found to be helpful. The fully adjustable types, such as Goldtouch, allow tendons and muscles to recuperate as the angle and shape of the keyboard is adjusted, avoiding overuse.

It may also be helpful to make use of alternatives to the conventional computer mouse, such as joysticks, tracker balls or touchpads. These may be foot-controlled or button- or switch-operated, and pen and tablet mice are also available.

Box 3: Living with learning disabilities

Mary, a policewoman suffering from dyslexia, became stressed by the problems she experienced writing up statements. A solution was found when she was given a laptop computer with a software program called "TextHelp Read and Write", which helped her spell-check, either after she typed or word-by-word as she typed. It included a word prediction facility and also enabled her to listen to speech output. Since using the software, Mary reported that statement writing had become easier, she became less stressed and, spent less time on the laptop. She also experienced less neck and upper-back pain that had been attributed to time spent bent over the computer.

Box 4: Laser pointer overcomes muscular dystrophy impairment

Luke, who works for a government agency, suffers from severe muscular dystrophy. His job was to proof-read documents and to write a summary for each one examined. For 18 months he tried to type using a device operated by his nose but strained his upper back. A speech slur prevented voice recognition software being used. A solution was found in a LUCY keyboard, which allows keys to be activated by a laser pointer mounted on the head. The LUCY keyboard avoided Luke having to use his nose and therefore, reduced the strain to his neck and upper back. This type of keyboard can be of benefit to those with conditions such as cerebral palsy, cervical/spinal cord lesion and chronic upper limb disorders.

Implementation and follow-up

Follow-up assessment, after the implementation of an AT application, is important to ensure an optimal match between person and technology and to identify new potential problems, such as pain or possible social interaction.

The aim of AT is to enable individuals with a disability to do their job productively and safely. However, reasonable workplace adaptations are likely to be a compromise between different considerations. For example, it may be less expensive for a business to relocate an employee who uses a wheelchair to a ground-floor office than to invest in an elevator to the usual workplace. Or it may be less disruptive to co-workers to invest in a document scanner than to restructure jobs so that documents can be read to a blind employee. Nevertheless, AT will clearly be playing an increasingly important role in facilitating greater integration of people with disabilities into working life.

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offers a course called "How to undertake personal risk assessments for disabled workers". The course is designed for anybody involved in risk assessments, and teaches the assessor how to avoid a conflict between health and safety and the DDA, and how to make reasonable adjustments.

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