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Assistive technology can help disabled users

Ergonomists have a good grounding to undertake assessments for people returning to work with a disabling physical condition, but often lack the information to carry out assessments for sensory impairments. However, having a knowledge of assistive technology and the challenges that face workers with a sensory impairment can help ergonomists make effective job modifications.

The terms assistive technology and adaptive technology are often used to mean the same thing although this is not necessarily true. Assistive technology refers to a piece of equipment or a product that is used to increase, maintain or improve functional abilities of individuals with disabilities. Adaptive technology is any hardware or software created or modified to enable people to use an interface with or without standard input or output devices.

It is also important to understand the difference between usability and accessibility. Usability impacts all users equally regardless of ability, and usability issues do not disadvantage a disabled user more than a person without a disability. An accessibility issue puts a person with a disability at a disadvantage to a person without a disability.

Mobility impairments are generally well understood, whereas cognitive and sensory impairments are less so. Likewise, a single disability may be well understood and assisted, but solutions for multiple impairment may be more difficult to find.

Visual Impairments

Screen enlargers (or screen magnifiers) work like a magnifying glass. They enlarge a portion of the screen, increasing the legibility. A number also provide a split screen that allows the user to view the magnified and non-magnified page simultaneously. This allows the user to 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 an example of a screen enlarger designed for people with severe low vision. It allows the user to adjust the way in which the image appears to suit their own eye condition. The 'BrailleNote' and 'VoiceNote' products have been developed to meet the needs of people who are blind. See www.braillenote.com/solutions/.

Screen readers are software programs that use a synthetic voice to present graphics and text as speech. A screen reader transforms a graphic user interface into an audio interface. If a user wants to search the web, then a voice browser would read all items on the web page—providing the page has been set up correctly. For more information on web accessibility, see

(Continued on page 2)

The Ergonomics Society needs to expand, and this newly launched 'Recruit A Member' Campaign is the chance for you to help us become a bigger and more influential Society!

There are a number of good reasons for increasing our membership. If we continue to pursue a Royal Charter, then we will need to demonstrate that we have as members the majority of people working in the field of ergonomics. We are a very small Society by Chartership standards, which is no problem as long as we can show that we represent most of the UK's ergonomists. Also, we need to boost numbers to increase our income from subscriptions – this will allow us to maintain and improve our services to members without asking you to pay more for your annual subscription. And, of course, if we have more members then we have a louder voice when we are representing the value and profession of ergonomics to government, other policy-making bodies and internationally. Quite simply, more members means more influence, and we need them all - Student, Graduate, Associate and Registered Members, and Fellows.

(Continued on page 5)

Inside this issue:

article

(Continued from page 1)

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the W3C consortium at www.w3.org/WAI. JAWS (Jobs Access With Speech) for Windows is a popular screen reader, see www.freedomscientific.com. A utility called 'Bobby' (www.cast.org/bobby) can be used to check whether web pages are compatible with screen readers and voice browsers.
Speech recognition systems, also called voice recognition programs, allow people to give commands and enter data using their voices, and may be used by people with language and learning disabilities who have difficulty typing or reading text.
Speech synthesizers receive text sent to the screen and then 'speak' it out loud. Often referred to as text-to-speech (TTS), the voice of the computer is synthesized speech, joining together pre-programmed letters and words.
Refreshable Braille displays provide tactile output of information represented on the computer screen. The displays mechanically lift small rounded pins to form Braille characters. The user reads the Braille letters with their fingers and then refresh the display to read the next line.
Braille embossers transfer computer generated text into embossed Braille output.

Special monitors and other types of hardware adaptations, such as CCTV, can be used to project paper copy onto a magnified screen. This is useful for someone who needs to read letters but cannot do so without holding it close to their eyes or leaning over to use a magnifying glass. To avoid possible postural problems and to increase productivity, a CCTV can be used.

The Royal National Institute for the Blind produce factsheets on technology for the visually impaired. See www.rnib.org.uk/technology/factsheets/readingaids.htm. The RNIB also lists UK suppliers and technical consultants, and produces a free video entitled 'Websites that work' which demonstrates screen readers and voice browsers. More information about assistive technology for people with visual impairments is available at www.abilitynet.org.uk, which includes helpful factsheets and links.

Guidelines for designing for people with partial sight and colour deficiencies can be found at www.lighthouse.org/Color_contrast.htm.

Not all workers with a visual disability require assistive technology, for example, a worker with the first stages of glaucoma may, for example, benefit from a flat screen on a monitor arm. This would be of assistance by allowing the screen to be brought close to them in order to angle it to get the best position from which the screen content can be seen. These are called 'assisted living products' because for the most part these products are not installed on a computer nor use electronics, and are therefore distinguishable from 'technology'.

Hearing Impairments

Products are available that can convert what is being spoken to sign language, text or an image for an individual who is deaf or hard of hearing.

Language Impairments

Screen review utilities make on-screen information available as synthesized speech and pairs the speech with a visual representation of a word, for example, highlighting a word as it is spoken.

Learning Impairments

Word prediction programs allow the user to select a word from an on-screen list, generated by the computer, based on prediction of words from the first few letters typed in. These programs help users increase vocabulary skills. Reading comprehension programs focus on establishing or improving reading skills through ready-made activities, stories, exercises, or games. They can help people who comprehend better when they hear and see text highlighted simultaneously.

Mobility Impairments

On-screen keyboard programs provide an image of a standard or modified keyboard on the computer screen. The user selects the keys with a mouse, touch screen, trackball, joystick, switch, or electronic pointing device.
Keyboard filters include typing aids such as word prediction utilities and add-on spell checkers. These products reduce the required number of keystrokes. Keyboard filters enable users to quickly access the letters they need and to avoid inadvertently selecting keys that they don't want.
Touch screens are devices placed on the computer monitor, or built into it, that allow direct selection or activation of the computer by touching the screen. These devices can benefit some users with mobility impairments by presenting a more accessible target.

Microsoft have a number of accessibility features, to assist in readability, for example. For full details go to www.microsoft.com/enable/.

Assistive technology is not just a software or hardware add-on, it can allow a user to increase function and allow them to perform tasks that previously they had been unable to do. However, the users's expectations must be considered and a demonstration of the equipment will let the user know the strengths and limitations of the assistive technology.

Duncan Abbott

An in-depth article by Duncan Abbott on assistive technology is to appear in Occupational Health Review *later this year.*