It is now commonplace in practice that the use of digital devices is discussed with patients. This might include a discussion about special coatings for high energy blue light blocking, or maybe a particular occupational lens design for screen work. However, the same is also true for visually impaired patients.

Whereas traditionally a practice might stock a couple of basic hand magnifiers, there is an ever growing range of electronic low vision aids (LVAs) which can make a real difference to visually impaired patients. This article gives an overview of some of the types available and the benefits they can bring to patients’ lives.

All registered dispensing opticians (DOs) can provide low vision advice to patients under the General Optical Council’s (GOC’s) Core Competency 6 (Low Vision) without the need for further specialist qualifications. Element 6.3 is: “The ability to advise on the use of and dispense appropriate low vision aids”; therefore, the advice below will help DOs to give up-to-date advice to patients on more modern aids, which are not covered by many textbooks.

SOFTWARE PACKAGES

Before discussing specific LVAs, let us first consider the normal computer or tablet. Data from the Office of National Statistics shows that internet use more than tripled for those aged 65 and older between 2006 and 2013; therefore, many patients will have some experience of these. They have a number of features which can aid visually impaired patients; these include being able to adjust the page zoom/magnification, the text type (font), and also the colour options & brightness. These simple adjustments are free and easy to make.

There are also a growing number of software products specifically designed for visually impaired people, two popular packages being ZoomText and Dolphin.

ZoomText (Sight and Sound Technology) not only provides magnification, but it can read out the text that is on-screen. This audio can also be recorded for playback later and newer versions of the software have added features, such as Key Echo, where each key typed is played back to the user. This software works with all internet browsers, email, text documents etc, and has braille support, although as it can cost up to £500 to purchase. Any interested patients would be advised to try the free download first.

JAWS (Sight and Sound Technology) is another software package, which is designed for those with more severe sight loss who struggle to see screen content. This software reads aloud what is on the computer screen and gives the user a unique set of tools for navigating and accessing web pages and all screen content. It also has braille functionality and can provide braille outputs instead of audio. This software is more expensive (from £625), but again patients should use the free trial before making a purchase.

Dolphin is another provider with a range of software for the visually impaired. Dolphin Guide is ideal for anybody who is sight-impaired (SI) or severely sight impaired (SSI), has little or no computer experience and is looking for an easy-to-learn solution with little or no technical ability. It uses a simple list of commands to navigate the options (Figure 1) and the colour of the text or background can be adjusted or magnified to aid clarity.

Figure 1: Dolphin Guide’s navigation screen

COMPETENCIES COVERED

Dispensing opticians: Low Vision, Optical Appliances, Standards of Practice
Optometrists: Optical Appliances, Standards of Practice

This article has been approved for 1 CET point by the GOC. It is open to all FBDO members, and associate member optometrists. The multiple-choice questions (MCQs) for this month’s CET are available online only, to comply with the GOC’s Good Practice Guidance for this type of CET. Insert your answers to the six MCQs online at www.abdo.org.uk. After log-in, go to ‘CET Online’. Questions will be presented in random order. Please ensure that your email address and GOC number are up-to-date. The pass mark is 60 per cent. The answers will appear in the November 2016 issue of Dispensing Optics. The closing date is 11 October 2016.
Optional extra features include hands-free navigation with voice control.

Tips:

• When selecting text and background colours it is best to select colours from opposite sides of the colour wheel (Figure 2), this should give patients good contrast of hues.
• Always use a free trial before purchasing software.
• It can take some time to become proficient so a ‘little and often’ approach is recommended, rather than long sessions.
• Ensure the patient is wearing a suitable correction; measure the working distance as you may need to alter the prescribed addition.

CLOSED CIRCUIT TELEVISION SYSTEMS (CCTV)

This type of magnification system was first described by Potts et al in 1959 and they started to be used more commonly in the 1970s with trials at Moorfields Eye Hospital. Over the decades, these have developed to become full colour devices with features such as auto-zoom and contrast alteration to enhance the image or even inverse it altogether. The system is made up of a video camera set above an XY moveable table, with the image being displayed live on the accompanying screen.

With optical magnification, the image is located at or within the lens-to-object working distance; for a simple magnifier this is the focal lens of the plus lens. With increasing power and magnification, the working distance reduces and at high powers it becomes more difficult to use the aid. This is not the case with electronic systems where the magnification can in some cases exceed 100x. The limiting factors to the magnification are the quality of the device and the size of the screen.

A couple of examples of CCTV systems are shown in Figure 3. These cost around £1,700, with process coming down, but have many advantages:

• High levels of magnification (exceeding x100)
• Magnification can be quickly and easily adjusted
• Due to a more comfortable working distance, the viewer can see the image binocularly which eliminates problems of convergence
• Due to larger screen sizes, the field of view is larger than what is possible with a simple hand or stand magnifier
• Additional features such as HD cameras, adjustable brightness, image reversal, contrast enhancement allow the patient to alter the image to make viewing more comfortable
• Features such as line marking and windowing aid the user following the text and are, therefore, less likely to lose their place.

Anyone considering one of these systems should talk to the manufacturers as it is normal practice to arrange for a home trial before making a purchasing decision. This will give the potential user time to try out different features and permutations of the device, as well as practice using the XY table.

PORTABLE TV READERS

CCTV systems offer high levels of magnification, but the high cost and limited portability may lead some patients to want a smaller device which can be connected to any TV or monitor. These portable devices still offer good levels of image quality and magnification for a lower price.
Bierley Magnifiers is one of the companies that can supply these portable aids. Its MonoMouse range (Figure 4) can be easily carried around and plugged into a TV or monitor. Starting at approximately £100 they are much more affordable, although they are not able to provide as high a level of magnification as CCTV – around 14x on a 20inch screen. They do not have all the features of the desktop CCTV systems, e.g. no line marking and limited image settings to change the contrast. It does take some practice as the user needs to be careful when moving the device over the object; unlike the desktop CCTV where the object is moved on the XY table.

HANDHELD ELECTRONIC LVAS (P-EVES)

Most visually impaired patients are given hand magnifiers as their first LVA; they are available in a wide range of powers and features such as internal illumination are very helpful, particularly with higher powers when the working distance is very short.

There are, however, a wide range of electronic devices which, although more expensive than traditional hand magnifiers, do have some useful added benefits which should be considered:

- Range of magnification
- One device can replace several magnifiers
- The viewing distance can be kept at the user’s habitual distance as magnification increases
- Ability to take photographs
- They can, therefore, also be used for distance in some cases
- Contrast can be adjusted and colours inverted
- Being rechargeable reduces the maintenance needs of the unit

A small selection is shown in Figure 5, and a comparison of some in Table 1, but there are many similar devices now on the market.

Many devices have a handle to aid the user and in order to simplify their use, the number of buttons has been kept to a minimum, for example, there are only three on the Compact 4HD. To make them more user-friendly, the buttons tend to be large and coloured, so that they stand out more; the Schweizer eMag43 is a good example of this.

Although many devices have three settings of magnification, which keeps the device simple to use, some have a continuous zoom system which grants more flexibility. It should be remembered that over time a patient’s vision can change and if their condition advances then higher levels of magnification will be required.

By having more than one level of magnification, a P-EVE (Portable Electronic Vision Enhancement System) will remain useful if the patient requires more magnification. A 4.3inch screen may seem small for viewing, but it should be remembered that a typical x6 hand magnifier has a diameter of about two inches, while the viewing distance for the P-EVE can remain at the patient’s habitual viewing distance. In a survey of potential users, screen sizes of less than 3.5 inches were considered too small, while screens over five inches were considered too large for regularly carry around outside of the home; the typical weight of the sampled P-EVES was 250-350g.

The Smartlux from Eschenbach (Figure 6a) has a five inch display along with three large, simple buttons which are also colour coded. These vary the display option, change the magnification (from 1.7x to an impressive 12x) and there is also the image...
capture button. When this button is pressed, the device will focus and capture a still image which can be viewed later. The basic memory allows for 20 images to be stored at any one time; although this can be expanded. Like many modern electronic devices, there is an auto-off feature, which will shut down the aid after three minutes of inactivity to preserve the battery life.

Like the other handheld devices, there are several display options (true colour, contrast enhanced black/white, white/black, black/yellow or yellow/black). Where this device differs from other handheld electronic LVAs is that it can be used in three different positions.

In its normal set-up, the device is a normal handheld magnifier; however, underneath the device there is a prop which when fully unfolded allows the device to become a stand magnifier (Figure 6b). If the user only unfolds the prop half-way, then the device will still remain standing on its own and the user will have room to write under the camera, e.g. for crosswords, Sudoku or signing a letter.

Again patients will need to practice with the aids, as with any magnifier, as well as learning to use the buttons. As with the CCTV systems, there are a number of image manipulation functions to adjust colours and contrast to suit the patient. Therefore, the patient may want to try out different colour features to find the combination which works best for them. Remember to check that the instructions are printed with text that is of a suitable size for the patient to read, or make sure that they have a friend or family member read them as well so that if they are unsure then they have someone to ask.

Manufacturers will provide at least 14-day home approval on such devices, which will allow for ample testing of the aid. Battery life varies but three to four hours is common, therefore, the patient needs to be able to easily connect the power cable to recharge the batteries. Most devices now have rechargeable battery packs which save the user having to purchase the correct type and size of battery or having to struggle changing them – especially if they have reduced dexterity.

**TEXT TO SPEECH**

With improvements in camera technology and increased processing power of the devices, there are now aids which can quickly capture an image of text and then relay the text as an audio output. One such portable example, for around £2,000, is shown in Figure 7 (ClearView Reader+). This is an excellent device for those who find reading difficult or slow. The portable device has five hours’ battery life between charges, with all the controls being located on top; with play, pause, forward and back as well as buttons to control the output such as volume, speed and a choice of different voices.

The camera requires good lighting, so there is an integrated light to aid the device in low light conditions. There is an inbuilt SD memory card so that items can be photographed and saved for playback later at the user’s convenience or if they have a lot of material to get through.

**WEARABLE DEVICES – ORCAM**

A further advance of text to speech software is OrCam (www.orcam.com), shown in Figure 8. This is a lightweight, wearable device powered by a small battery pack. The output is transmitted via the temporal bone so that although the wearer can hear what is being said, it is not audible to others in the vicinity. Being spectacle mounted it is light and not too obtrusive; neither does it draw attention to the

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>SCREEN SIZE (inches)</th>
<th>MAGNIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optelec Compact +</td>
<td>4.3</td>
<td>3 settings – 5x, 7.5x, 10x</td>
</tr>
<tr>
<td>Optelec Compact 4HD</td>
<td>4.3</td>
<td>Continuous – 1.7x to 12x</td>
</tr>
<tr>
<td>Schweizer eMag43</td>
<td>4.3</td>
<td>3 settings – 5x, 7.5x, 10x</td>
</tr>
<tr>
<td>Eschenbach Mobilux</td>
<td>3.5</td>
<td>3 settings – 3x, 4x, 6x</td>
</tr>
<tr>
<td>Eschenbach Smartlux</td>
<td>5</td>
<td>Incremental – 1.7x to 12x</td>
</tr>
</tbody>
</table>

Table 1: A comparison of handheld P-EVES devices
Text and other objects can be programmed in, for example, items around the home such as food items or bank notes. It can also be programmed to recognise people’s faces; so no more guessing who has entered the room; this is ideal for patients with central vision loss such as age-related macular degeneration. The device does require programming for each item so training is required; however, as the device is activated by a simple point of the finger or press of a button, most patients should adapt quickly to it.

The technology is still very new, but over time as the software develops then it is likely that more of these wearable devices will appear on the market.

FINAL THOUGHTS
Here is a short list of some key points which should be considered for each patient:

- Consider the age of the patient and their experience
- Do they have any co-morbidities, such as hand tremors?
- Do they have a budget or can they get funding? (Funding may be available if the device is needed for employment or education)
- What spectacle correction will the patient need to wear and what will the working distance be?
- Always try before you buy

DISCLOSURE
The author has no conflicts of interest, no financial interest or personal involvement with any of the companies or products mentioned in this article. The devices mentioned are examples of a wide range of aids available from many different suppliers.

REFERENCES

ANTHONY BLACKMAN is a senior lecturer in the Faculty of Health and Wellbeing at Canterbury Christ Church University; professional lead for ophthalmic dispensing, and an academic link tutor, for ABDO College; an ABDO board member, an ABDO and WCSM examiner; locum DO and CLO; and WCSM distance learning tutor. He is also studying for an ophthalmic doctorate at Aston University.