

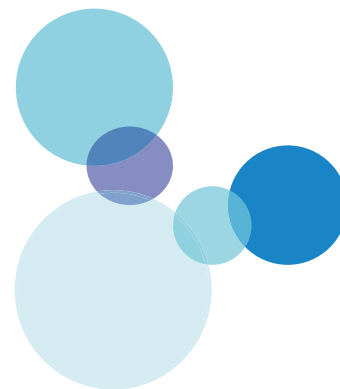
Input and output devices for specific needs



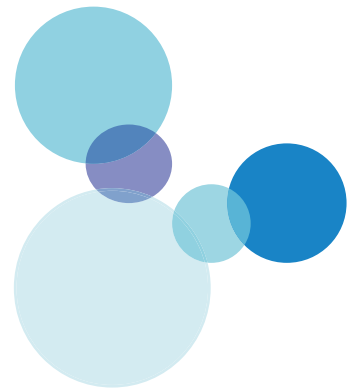
Teacher's Notes

Lesson Plan

Length	60 mins	Specification Link	212/r	
Learning objective	Candidates should be able to: (r) discuss input and output devices for users with specific needs			
Time (min)	Activity	Further Notes		
10	<p>To illustrate the difficulties for visually impaired users: Using a projector, display the computer's desktop and a word processing program.</p> <p>Ask for a volunteer and after blindfolding them, ask them to select items from the screen and enter required text into the word processor.</p> <p>The students may find this activity amusing, but point out that some people face these problems every day, and that with perseverance and assistive technology they are able to successfully overcome these challenges that others never have to face.</p> <p>Explain that many users have particular requirements and that 'assistive' technology has produced many devices to help them.</p>			
10	Watch the video, pausing to discuss the content.			
5	<p>Discuss the video to assess learning. Ask questions such as:</p> <ul style="list-style-type: none"> • What hardware devices could be used to assist visually impaired users? • What software can assist visually impaired users? • What hardware devices can assist users with little physical mobility? 	<p>Answers:</p> <p>Magnifiers, Braille printers, Braille displays.</p> <p>Speech recognition software, screen readers, magnifiers built into the operating system.</p> <p>Sip-and-puff and eye gaze devices.</p>		
10	The students use Interactive Activity 1 .			
15	<p>Worksheet 1</p> <p>Students to complete Worksheet 1 either on paper or on computer. They may need access to the Internet to research some of the questions.</p> <p>Ask individual students for their answers and discuss with the class so that all students will have the correct answers.</p>	<p>Answers provided.</p> <p>Ask students with the correct responses to explain to the class how they arrived at their answers.</p>		



Time (min)	Activity	Further Notes
	Extension Challenge/Homework Students to complete and submit Worksheet 2 for homework.	
10	Plenary – How can the operating system help? Ask the students to investigate accessibility options built into the operating system. In Windows they can be accessed from Start > All Programs > Accessories > Ease of Access. On the Macintosh they can be accessed from System Preferences > Accessibility.	



WORKSHEET 1 ANSWERS

- 1** Describe the following input and output devices and explain how they can assist users with specific needs.

(a) concept keyboards

These are large boards with a grid of sensitive areas that function as individual keys or can be combined into larger ones.

They are covered with removable paper or plastic overlays, which indicate what will be input when they are pressed. These could be images or letters.

The larger key area can help people with movement disabilities.

The simplified design and use of images can help people with learning difficulties.

They can have high contrast or Braille overlays to help people with visual impairment.

(b) tracker balls

Tracker balls are like upside down mice so that the ball is exposed. They also have large buttons, which can be programmed to perform various functions, e.g. hold down the shift or control keys, single and double click, drag or scroll.

They are useful for people with limited arm and hand movements as the ball can be moved with the flat of the hand.

Versions are available for foot operation for people with no arm movement.

(c) sip-and-puff devices

With sip-and-puff devices, users sip (inhale) or puff (exhale) air through a special tube.

The user can move the on-screen cursor by moving their head to move the tube.

A left click can be performed by blowing or puffing and a right click by sucking or sipping.

It is ideal for people who do not have use of their hands.



(d) eye gaze devices

These devices allow a user to navigate and control their computer with their eyes. They only require the movement of the eyes and no other muscles are required.

Highly sensitive cameras capture infrared light reflected from the retina and cornea of the eye. The software then builds a 3D model to determine the 'gaze point' – where the eyes are looking at relative to the computer screen. The device can thus control a cursor in a similar way to a mouse.

To 'press' buttons, the user simply needs to look at a specific command or icon on the screen for a certain amount of time, usually a fraction of a second. Each computer can be programmed based on a user's preferences. For instance, a 'yes' command can be looking at the 'yes' icon on the screen for a full second, or a 'no' command can be set to 1.5 seconds.

(e) speech recognition and screen readers

Speech recognition software allows a user to control the actions of a computer, such as moving the cursor and left and right clicking, by speaking commands.

Data can also be entered in a similar way.

This method can be used by people who cannot move or who are visually impaired.

Screen readers convert text to speech and will 'read out' what is on the screen. They can also notify the user what icon or item on the screen the pointer is indicating.

These are obviously of benefit to visually impaired users.

(f) Braille input and output devices

Braille keyboards allow visually impaired users to enter data into a computer whilst a refreshable Braille display converts the screen display to a Braille equivalent.

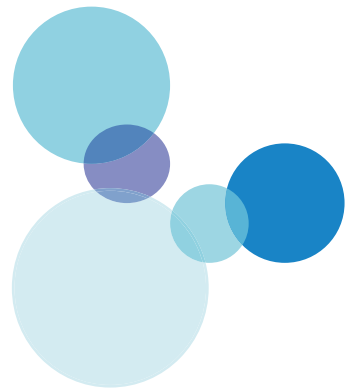
Braille printers can be used to output hard copy of a document in Braille format.

(g) screen magnifiers

Magnifiers can be placed over a screen to assist visually impaired users.

Most software allows users to 'zoom in' and most operating systems have a built in screen magnifier.

For instance in Windows, pressing the 'Windows' and 'plus' key together will launch the magnifier to increase the size of the screen display.



WORKSHEET 2 ANSWERS

- 1** (a) Describe two hardware devices that would assist visually impaired users to use a computer to enter data. (4)

Any two from:

Screen magnifiers that can be placed over the screen to increase magnification.

Braille keyboards that allow users to enter text using Braille.

Refreshable Braille displays that convert the text displayed on the screen to Braille format.

Braille printers that allow the output of hard copy in Braille format.

NB: The question asks for hardware devices and thus software only solutions such as speech input and screen readers are not suitable answers.

- (b) Explain how eye gaze devices can be used to operate a computer and enter data. (4)

Infrared light reflected by the cornea and retina is detected by highly sensitive cameras.

They use this to determine what the user is focusing on – the ‘gaze point’.

This can be used to move the on-screen cursor.

To issue commands, the user must look at a particular icon on the screen for a certain length of time.