

Chapter 7

On-screen Keyboards

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7.1 Introduction

This chapter introduces *on-screen keyboards* accessed using pointing devices or switches. We look at the overall concept and some general points about what the on-screen keyboards can do, and why particular features (identified in **bold**) are helpful. In this chapter we also look at accessing the on-screen keyboard using a mouse or pointing device.

Later chapters consider particular aspects of on-screen keyboards in greater detail:

Chapter 8 examines access to on-screen keyboards using switches and scanning. At the end of Chapter 8 there is also a short section on control and access via Morse Code.

Chapter 9 deals with the range of switches available, and how they are chosen and used to operate special access systems.

Chapter 10 gives guidance and examples on using on-screen keyboards to access three core areas of the curriculum: writing and recording work; reading and accessing sources of information; and talking and communicating.

Chapter 11 reviews the most popular on-screen keyboard programs available in the UK and compares features and selection sets.

An on-screen keyboard access program displays a picture of a keyboard on the screen. We call the on-screen keyboard a *selection set*, containing a number of *items*, following the *Common Terminology for Switch Controlled Software* (ACE Centre, 1990). Other terms for selection set are *grid*, *setup*, *window* or *layout* while an item may be called a *cell*, *key*, or *button*.

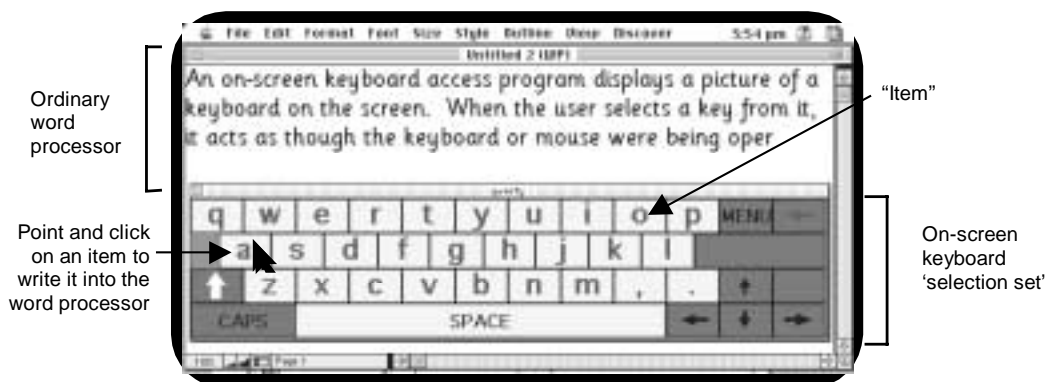
Items in selection sets may display **text**, **graphics**, or both. To select an item from the keyboard, you:

- **point and click** or **dwell**² with the mouse or pointing device; or
- **use scanning** and **switches**

Figure 7-1 illustrates point-and-click access: the user moves the mouse pointer to the required item, clicks the mouse button to select it, and the letter is typed into the wordprocessor as though the ordinary keyboard was being used.

The on-screen keyboard can be used to type text into all standard programs running on the computer such as: wordprocessor, database, spreadsheet, drawing program, games, Internet browser etc.

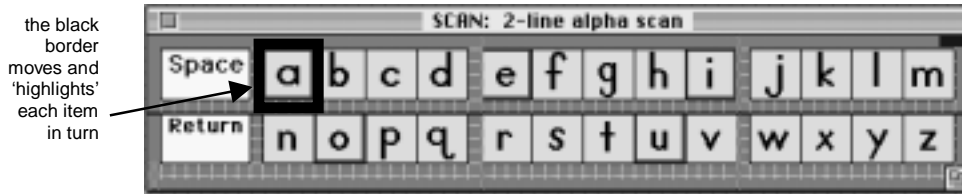
Figure 7-1 Clicker On-screen keyboard operating a standard wordprocessor



² If the user is unable to press a button or switch, but is able to keep the pointing device steady for a short time, dwell selection can be used – the key is selected when the pointer rests on it for a set length of time called the *dwell time*.

Figure 7-2 shows a simple scanning display operated by a single switch. The black *highlighter* moves along from item to item and when the switch is pressed, the highlighted item is selected and the letter is typed on the wordprocessor screen.

Figure 7-2 A simple *Discover:Switch* scanning selection set

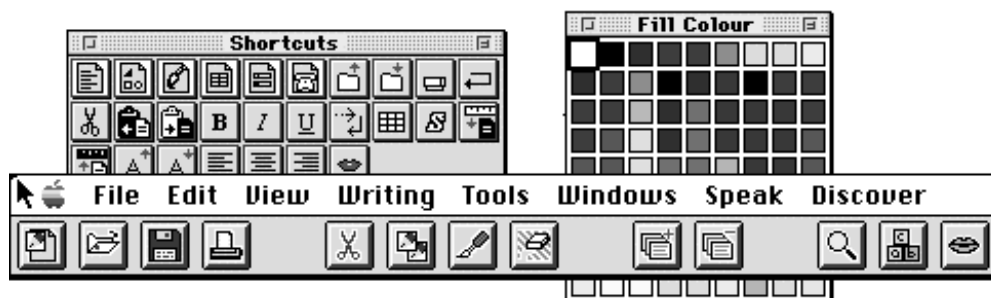


7.2 Who might use on-screen keyboards?

Everyone!

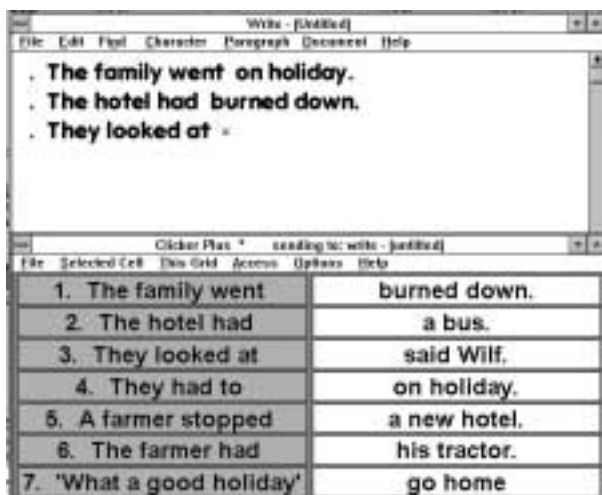
All computer users routinely use on-screen keyboards – whether in the form of floating ‘palettes’ of colours for drawing programs, or ‘Shortcut menus’ or ‘Toolbars’ (Figure 7-3). These are simply convenient and quick ways of presenting a set of options which, when selected by pointing and clicking with the mouse, do something on the machine. Palettes are used because there is no practical alternative using the keyboard. The Shortcuts or Toolbars are used in preference to keystroke equivalents so that the user does not have to remember the keystroke for each command; and they are also quicker to select from, compared with pull-down menus.

Figure 7-3 Toolbar, shortcut and floating palette on-screen keyboards



Early writers (with or without special educational needs) can use on-screen keyboards with whole words or phrases for word recognition and sentence building. The Clicker set in Figure 7-4 is for Primary 1 children working on the *Oxford Reading Tree* scheme. The child can click on a phrase to hear it spoken out (a ‘cue’ or ‘prompt’) and once satisfied that it is the correct item, click again to type it on the screen.

Figure 7-4 *Clicker Oxford Reading Tree set*



Pupils who have difficulty with the keyboard but can operate a pointing device or switch and scan can use an on-screen keyboard to generate letters, keys and words instead. The main groups of users in this category are people:

- with limited hand movement range and power (perhaps as a result of muscular dystrophy, for example) who cannot reach across the keyboard, but can operate a pointing device such as trackball or touch pad;
- with poor fine and gross motor control but good head control (as a result of cerebral palsy) who can use a head-pointing device (see Chapter 4);
- with no lower limb control but good head control (as a result of a spinal injury);
- who have a combination of physical and other problems that make keyboard use difficult;

Case Study

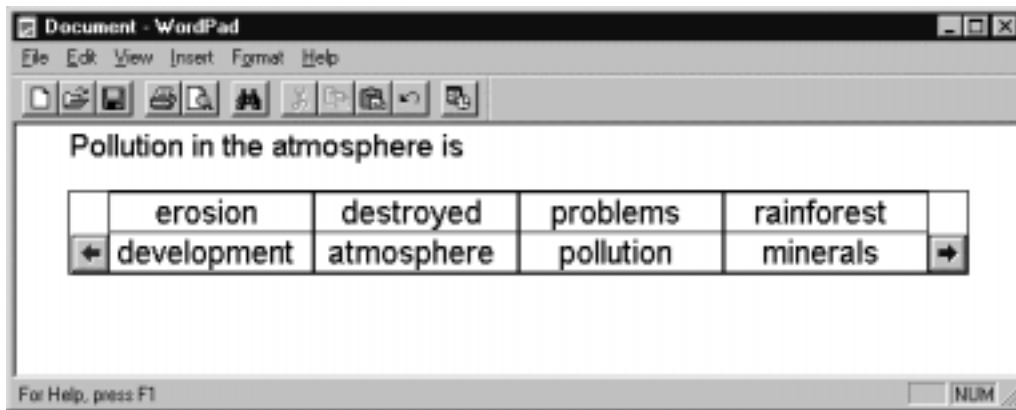
'Michael' is visually impaired and has physical difficulties. He is in a mainstream Primary school and is learning to read and write. He can use a standard keyboard with a keyguard, but it is very slow because his small visual field means that he is constantly shifting his gaze from the keyboard to the screen and back again and he often gets 'lost' in the process. Also, once he has located the screen or keyboard he has to search them to find the end of the text or the key he wants.

He is much faster using a Roller trackball to select letters from a Clicker on-screen keyboard because he can see the text and the keyboard on-screen at the same time, and because he can use the Penfriend 'word prediction' to select whole words rather than typing letter by letter.

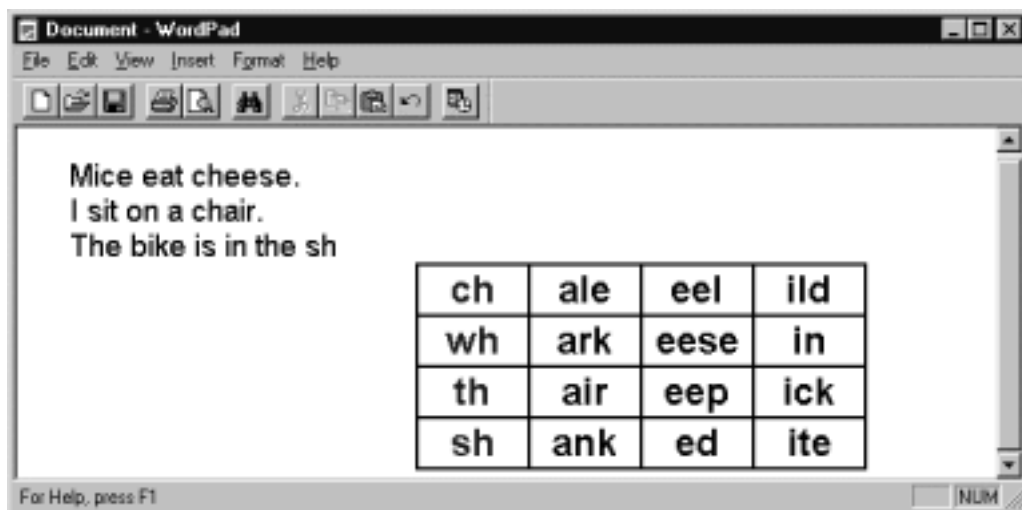
- with severe physical and other impairments who can only control one or two switches. Chapter 8 covers switch and scan access in more detail.

Pupils who have a specific reading or writing difficulty can use the visual and spoken prompts from word lists on the screen to support writing and literacy.

Pupils who have problems spelling particular words can create lists of the difficult words and then point and click to insert the word (correctly spelt) into the document. Speech cues can help the writer identify the correct word from the list. Selection sets can be created for different pupils and different subjects.

Figure 7-5 *Point for Windows* topic-based word bank

On-screen keyboards can also be used within a teaching program as in the case of the *Point for Windows* word-blending selection set in Figure 7-6. Digitised recordings of the word parts reinforce visual recognition while synthetic speech feedback from a talking wordprocessor confirms the blended words.

Figure 7-6 *Point for Windows* word blending selection set

7.3 Selection Set Design and Layout

There are many ways to arrange and group the items in a selection set. Alphabetic and QWERTY layouts are commonly supplied with the on-screen keyboard program. Extra sets may be available for particular tasks, and some programs let you change the selection set or design new ones using a *Selection Set Editor*.

Letter and Key Selection Sets

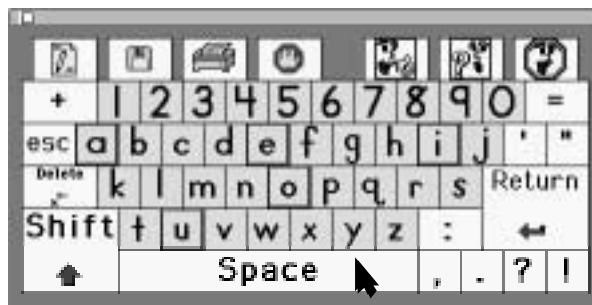
The *Wivik* QWERTY selection set in Figure 7-7 has most of the keys of the standard keyboard available for immediate selection and is suitable for those who need quick access to all the keys on the standard computer keyboard. However, it can be confusing for younger users, beginners or those who are not familiar with the QWERTY layout.

Figure 7-7 *Wivik* selection set with complete QWERTY layout



Figure 7-8 is a simpler design with the letters of the alphabet and numbers, plus common functions like 'Print' and 'Save to disc' which are shown as icons (most on-screen keyboards let you control the wordprocessor functions as well as write text).

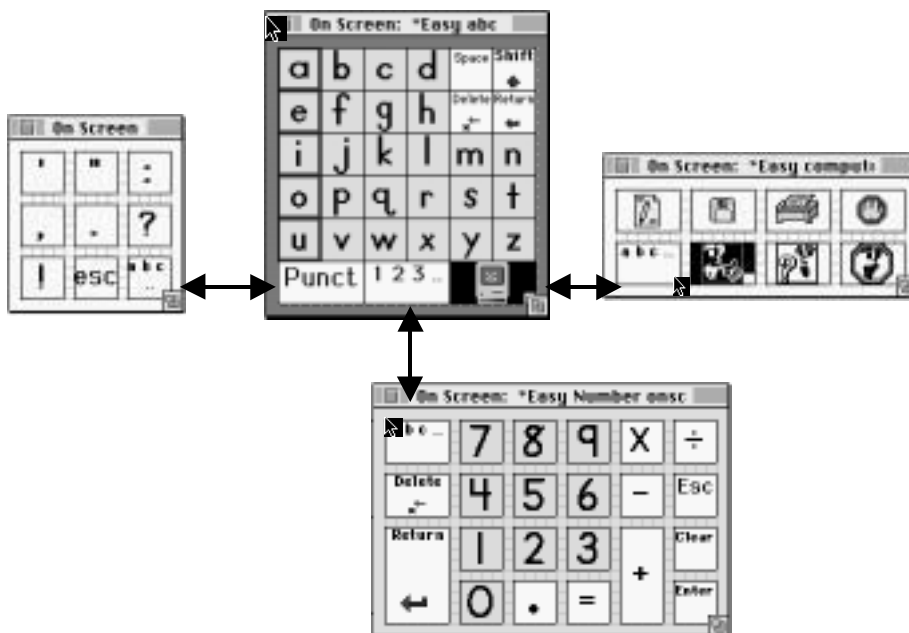
Figure 7-8 *Discover:Screen* simple alphabetic layout



This selection set may still be relatively complicated for new users. Visual complexity can be reduced by designing several 'linked' grids, each holding a group of keys or functions (Figure 7-9); in this case letters, punctuation, numbers and computer operations. The user writes with the main letter selection set and then selects the 'Punct', '1 2 3..' or 'Computer' item to *branch* to the sub-sets. Selecting the 'a b c..' item returns to the main letter-grid.

Linked grids are not only smaller and less cluttered, they are also much more efficient when scanning because the user does not waste time scanning through irrelevant items.

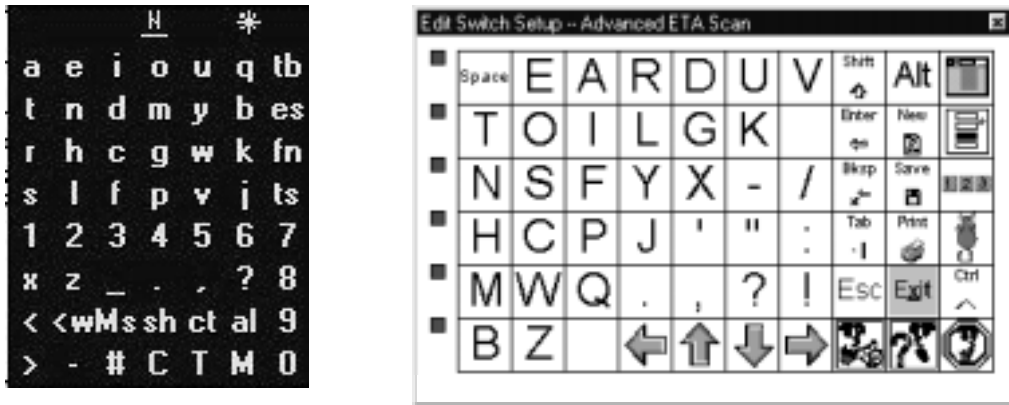
Figure 7-9 Splitting a selection set into four linked grids



Different letter layouts can also effect ease of use and speed. There is often little advantage to be gained from using the standard QWERTY for the on-screen keyboard: alphabetic layouts or 'frequency of use' layouts may be easier to use and faster.

Figure 7-10 shows two frequency of use layouts which place the keys in positions where they can be accessed most easily. For a point-and-click selection method the most common letters are grouped together, with the less commonly used items arranged further away. For a scanning system the most common letters are placed closest to where the scan starts (usually, in the top left hand corner).

Figure 7-10 EZ Keys and Discover:Switch Frequency-of-use scanning layouts

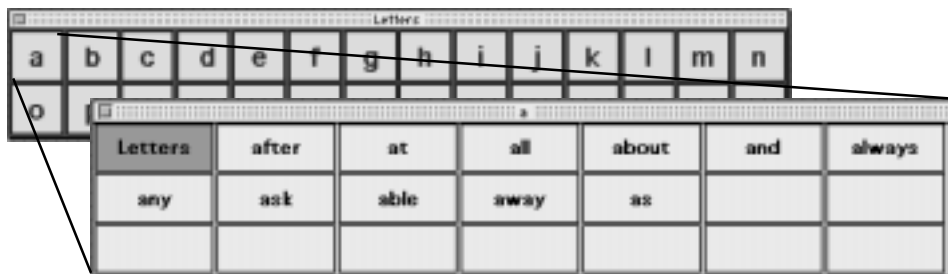


Note that although the frequency of use layout is theoretically physically fastest, many users, especially young children, will be faster initially with an alphabetic layout because they are more familiar with it.

Word and Phrase Selection Sets

With most programs, you can design selection sets with words or phrases as items. Word lists can be arranged by topic, or linked to letter-grids. In Figure 7-11 clicking on the letter 'a' for example, will not type the letter into the word processor, but will instead close the letters set and open a set of words beginning with 'a'. Clicking on a word will type it on the screen. Then the user clicks on the 'letters' item to go back to the alphabetic set. The selection set in Figure 7-11 has empty items so that you can add your own words. Some programs (e.g. SAW) have *pop-up* grids which automatically jump back to the main grid after an item is selected, thereby saving a selection.

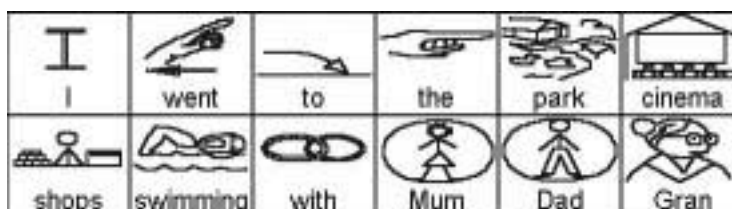
Figure 7-11 Clicker 'dictionary' grids



Selection Sets with Graphics and Symbols

Most of the on-screen keyboard programs can display *graphics*, *pictures* or *symbols* within the selection set so the system can be used by students who have difficulty with text. Symbol-based systems can generate text or ‘symbol sentences’; and/or produce *synthetic* or *digitised speech*, for spoken communication. ‘Pages’ of symbols can be linked together, organised by topic or language, to give the user access to a wide symbol vocabulary. Usually it is possible to display both the symbol and a corresponding text label on the same item. Chapter 10 discusses applications of symbol-based layouts in more detail.

Figure 7-12 *Point for Windows* symbol set



7.4 Selection Set Appearance

The appearance of the selection set may be altered to suit individual users. Control over the presentation is particularly important if the user is partially sighted or has visual difficulties. The on-screen keyboard software may let you to change one or more of the following features:

Size

A large selection set with large items is obviously easier to see, and easier to target for point-and-click accessing, but takes up more room on the screen so that there is less space for other programs underneath. Most programs let you move and re-size the set and automatically adjust the size of the individual items correspondingly. *HandsOff!* has a neat ‘docking’ feature which fits the selection set to the application program.

Sometimes it is necessary to increase the size of the individual items to compensate for a visual impairment but this can make the grid too large. In this case the items can be split up into several smaller linked selection sets (see Figure 7-9). Some programs (*Clicker 2*, *Wivik*) allow you to specify a standard item size which is applied automatically to all the items whereas others (such as *Discover:Screen*) require each item to be sized individually, which takes more time.

Item Spacing

Spacing items further apart can help users find particular keys more easily, and may help point-and-click users who tend to make incorrect selections by straying over the boundary of an item.

With some programs (*Point for Windows*, *Clicker 2*, *Wivik*, *EZ Keys*) you can specify the size of the spacing and the program automatically reduces the size of the items so that they still fit in the same overall selection set size. Others require each item to be adjusted individually which again takes more time.

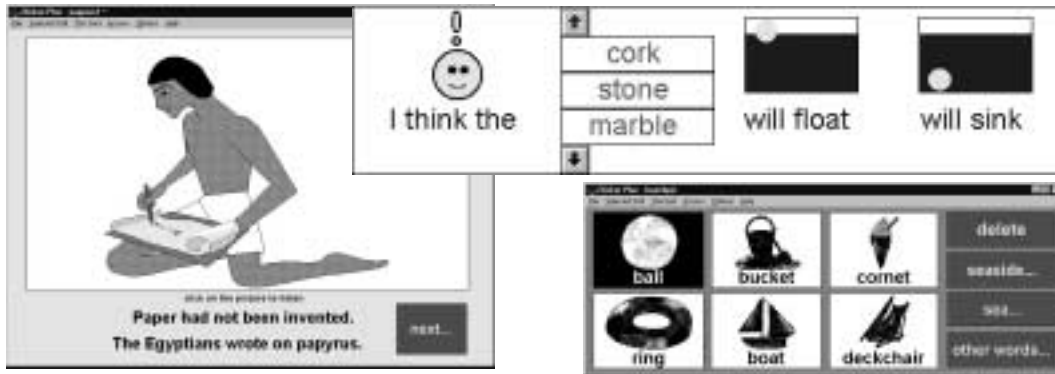
Shape

The selection set may take different shapes:

- **Single line** – suitable for displaying a small number of items in a single row or column

- **Grid** – the more common ‘matrix’ style suitable for a larger number of items
- **Flip-chart** – where items or grids are flipped over and offered one at a time, to reduce the visual load on the user
- **Custom** – where items are placed in different positions around the selection set. Figure 7-13 illustrates three uses for custom screens: creating talking multimedia resources (*Clicker* ‘Egypt’); for designing on-screen activities (*Point* ‘FloatSink’); or for grouping topically or syntactically similar words (*Clicker* ‘Seaside’); and many others. A particularly useful custom layout is for adding *hot-spots* or screen *markers* to programs which do not have special access features.

Figure 7-13 *Clicker* and *Point* custom or irregular grids



Frame Styles

Some access programs offer a choice of styles of the frame around an item. Some common frame styles are shown below:

Figure 7-14 Examples of frame styles





The button frame style can be used to good effect to simulate the look of a physical keyboard or to mark special keys such as Backspace  and Return  as in Figure 7-15.

Figure 7-15 Two uses of the button frame style



Changing the frame colour and width so that particular keys stand out can also be a useful method of marking out particular keys (as in Figure 7-8 where the vowels have a red frame).

Colour

Colour can be used to design layouts for users who require high-contrast display; to discriminate between different types of item; and to improve the appearance of the grid.

Users with a visual impairment may prefer particular foreground and background colour combinations such as yellow text on a blue or black background (Figure 7-16).

Figure 7-16 *Point for Windows* grids with standard and high contrast

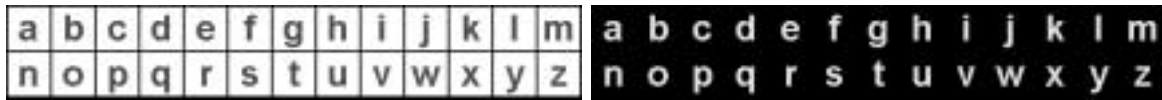


Figure 7-17 shows how colour can be used to group words in different grammatical categories.

Figure 7-17 *Clicker* grid with colour-coded words



Some programs, such as *Point* and *Clicker 2*, allow colours to be set for the entire grid, whereas others require each item to be adjusted individually. Colour should be considered along with the method and colour used for highlighting (see below).

Text font

Most programs let you choose the text size, font and style displayed. When an item is re-sized, the text size is usually adjusted to suit. Young children may prefer a simple lower case font, while a larger font/item size may be required for those with visual or perceptual difficulties.

Highlighting and prompting

When an item is highlighted (i.e. the pointer or scanner moves over it) it may be indicated *visually* with a border or a change in colour, or an *auditory prompt* such as a beep, click or speech may be given. Some voice-output communication systems can even play a cartoon animation when highlighted.

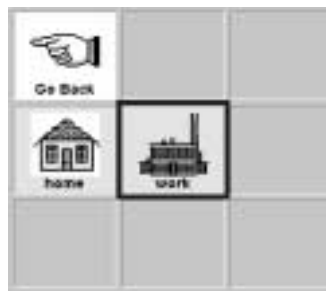
Visual highlighting

Figure 7-18 Invert highlight style



One method of visual highlighting involves changing the *foreground* and/or *background* colour of the item. Some programs invert the colour to highlight the item (Figure 7-18). For example, if the item normally has a white background, then it changes to black when the item is highlighted. The background and foreground colour must be chosen carefully as certain combinations of text and background colours may produce unsatisfactory effects. If the text is black, highlighting the item by inverting the background from white to black would make the text invisible! Or if the highlight colour is the same as the background colour, the scan will not be visible. Ideally, the access program should allow both the normal and highlight colours of the item's foreground and background to be individually specified, or should invert both foreground and background colours when highlighting, and should offer *visual frame* highlighting as well (Figure 7-19).

Figure 7-19 Frame highlight style



It is not always desirable to highlight an item by changing its foreground and/or background colour – if the colours clash, or if the user has a visual impairment or some difficulty with colour perception. The frame highlight style works by putting a coloured frame or border around the item. Again, some care is necessary to avoid unpleasant or low contrast colour combinations – for example, the frame colour should contrast with the background colour of the selection set. Frame highlighting is also faster than inverting or changing the background colour. The Clicker manual recommends that frame highlighting should only be used with graphic selection sets, otherwise the scanning will slow down.

Auditory prompts

Users with visual, perceptual or learning difficulties may benefit from auditory prompts where a beep or speech is given when the item is highlighted. Speech may be *digitised* (recorded) or *synthetic* (see Chapter 13 for more information on speech output). Ideally, the program should allow you to specify one recording or message for highlighting and a different one when the item is selected. A different voice or volume can help a user distinguish between a prompt and a message, and a short single word 'summary' prompt is usually preferable if the message given when the item is selected is a few words or a phrase.

It is important that any speech feedback is *synchronised* to the scan so that the speech matches the item being scanned: at fast scanning speeds this can slow down the scan so that there is enough time to give the message. Some programs (notably *EZ Keys*) do not synchronise the speech and while this may not be a problem at slow scan speeds it can be very confusing at faster rates if the visual and auditory cues are not given together.

7.5 Selection

Once the required item is highlighted it can be selected by pressing the mouse button or switch, or by *dwelling* (waiting) on the item for a short pre-set time. Full descriptions of pointing device selection methods are given in Section 7.8 on p.117 while switch and scan systems are covered in Chapter 8.

Feedback on selection

It can be helpful if the program gives some feedback when an item is selected. Most programs can at least beep to confirm a selection while some can also flash the background of the selected item.

Action control

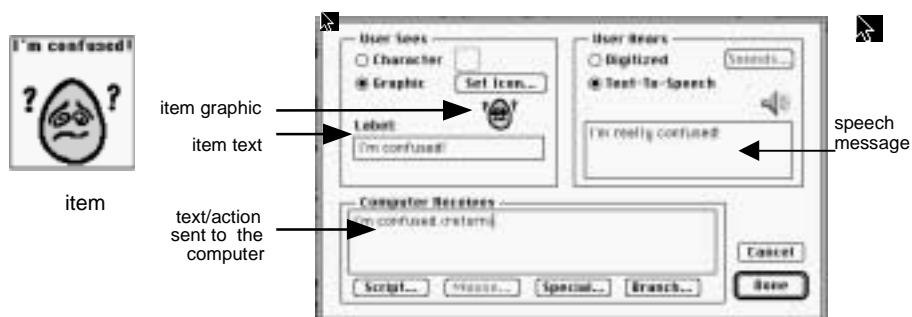
When an item is selected by the user, it can perform one or more actions (see below). Most programs perform the action as soon as the switch or button is pressed down (**‘Press for action’**). The *Discover* programs are different – they perform the action once the switch or button is released (**‘Release for action’**). The latter method lets the user hold down the switch and pause before the action is actually taken, but sometimes users with severe physical and learning difficulties can get confused because they expect the action when the switch is pressed, not released.

7.6 Actions

The most common actions that the on-screen programs can perform are described below. Most programs allow the presentation and action of a particular item to be changed using a **Selection Set Editor**. Figure 7-20 shows the *Discover:Screen* editor by way of example. The item being edited contains a symbol and a text label as shown. Within the editor, the text and symbol are defined by the ‘User Sees’ section. When the item is selected by the user, the text message “I’m confused”, followed by eis typed on screen. The text message is defined within the ‘Computer Receives’ section. The ‘User Hears’ section defines the speech or sound produced when the item is selected – in this case the speech synthesiser says “I’m really confused!”.

Most of the on-screen keyboard programs have selection set editors which have similar functions to the one below – examples are given below and Chapter 11 gives more detailed examples of how different actions can be used in practical learning situations.

Figure 7-20 *Discover:Screen* item and selection set editor



Keyboard actions

- **Send text**

All the special access programs listed in this chapter can type a single letter, word or phrase into a word processor or other application program.

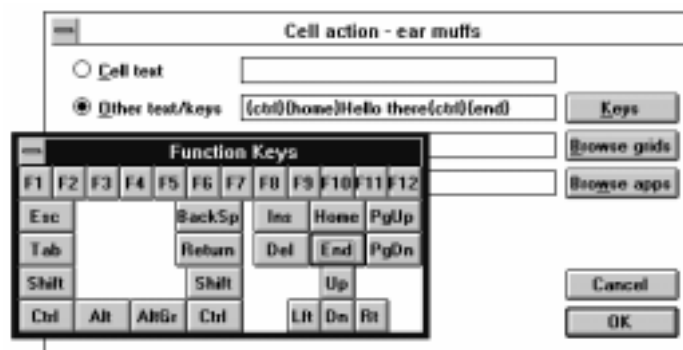
- **Send graphics**

Some of the programs can also insert a graphic or symbol into the word processor.

- **Cursor keys and control key combinations**

Most of the programs can operate the cursor keys and control keys (e.g. j, e, b, a, ^, etc.) either individually, or in combination with other keys. For example, in Windows, by programming {b-P} into an item, it will print the document when it is selected (the equivalent for the Macintosh is {⌘-P}). In Figure 7-21 the sequence bg Hello there b moves the cursor to the beginning of the current line, types 'Hello there', then moves the cursor to the end of the line.

Figure 7-21 Clicker control key sequence



- **Sticky keys**

'Sticky keys' (see *Chapter 3 Accessing the Keyboard*) enables any combination of control or modifier and letter key (e.g. {j-H}, {b-P} etc.) to be generated by selecting the modifier (e.g. Shift, CTRL, ALT etc) first, followed by the letter.

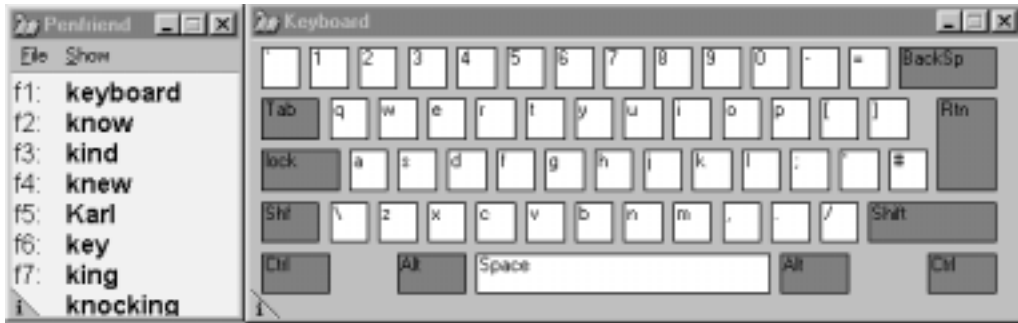
Acceleration features

Acceleration features are described in greater detail in the section dealing with Writing, in Chapter 11, and in *Supportive Writing Software* (Nisbet et al, 1998). Since all the access programs can replace a standard keyboard they can all be used with the wide range of acceleration and support programs available for keyboard users such as *Co:Writer*, *Prophet* or *Penfriend*. Some access programs can integrate with particular predictors so that the user can operate the access program and predictor in a reasonably 'seamless' way (*Discover* and *Co:Writer*; *Clicker* and *Penfriend*; *SAW* and *Prophet*). Some access programs (e.g. *EZ Keys*, *Wivik*) have acceleration features built-in. *Penfriend* is the opposite: a predictor with a built-in on-screen keyboard (Figure 7-22).

- **Prediction**

Word predictors offer a list of the most frequently or recently used words and the user selects a whole word with the mouse or function key rather than typing it out letter by letter. Word prediction reduces the number of selections needed and so usually increases the speed at which you can write with the on-screen keyboard.

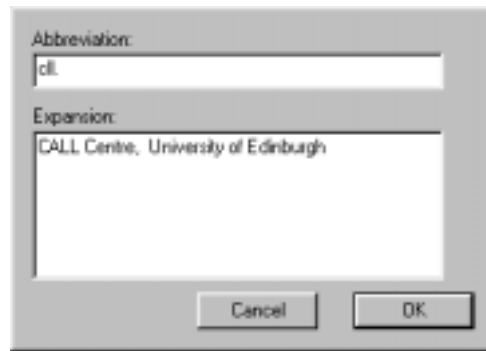
Figure 7-22 *Penfriend* predictor and on-screen keyboard



- **Abbreviation expansion**

Abbreviation expansion enables the user to type a short abbreviation which the program expands into a longer word or phrase.

Figure 7-23 *Penfriend* abbreviation expansion



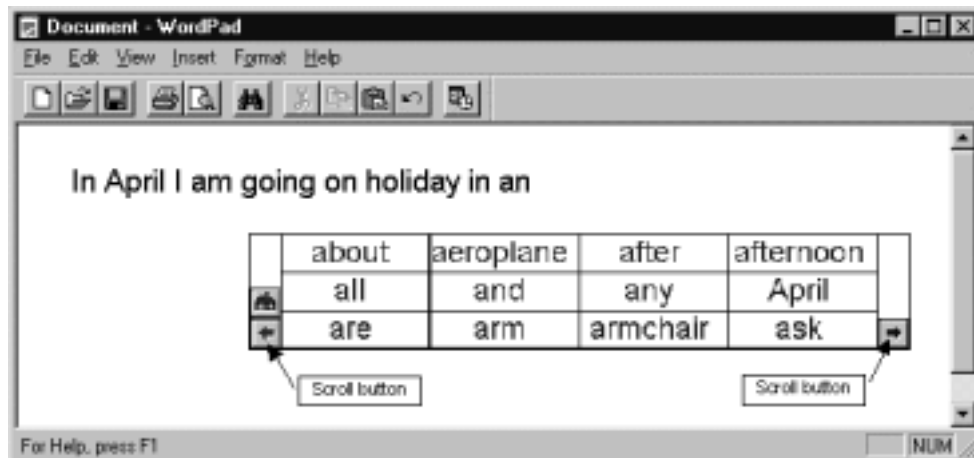
- **Smart punctuation**

Smart punctuation automatically adds spaces after punctuation marks and capitalises the first letter following a full stop.

- **Scrolling word lists**

One program (*Point for Windows*) can offer scrolling lists of words within selection sets: in Figure 7-24 the user clicks on the scroll buttons to display more screens of words beginning with ‘a’.

Figure 7-24 *Point* ‘dynamic’ scrolling word lists



Mouse actions

There are several ways in which a switch user can control the pointer and the mouse button(s); these are described in greater detail in Chapter 4 and Chapter 8. The selection set can contain items with *direct moves* or a *rotating pointer*. *Screen markers / hot spots* enable the pointer to jump to particular locations on the screen. *Scanning menus & buttons* automatically scan the menus and buttons on the screen.

Computer / program control

In addition to keystroke and mouse pointer short-cuts and control, many on-screen keyboard programs have other features for improving speed and ease of use.

- **Automatic startup**

All programs can be set to start automatically when the computer is switched on, by putting the program into the 'Startup' folder. This enables the user to get started straight away without needing assistance.

- **Save/load user settings**

Saving and loading a combination of selection set plus control settings (e.g. mouse speed, scan rate etc.) is helpful if there are several users of the same computer. It can also be useful for those who use several different application programs: for example there might be one selection set with letters and keys for a word processor, another with mouse commands for organising the desktop, and a third with mouse and keystroke combinations for an Internet browser.

- **Open set automatically with application**

This feature ensures that the correct selection set is loaded automatically whenever a particular application is started.

- **Open application**

To save having to move the mouse pointer and load word processors or other programs from the desktop, some programs can load applications just by selecting an item.

- **Switch applications**

Some users will wish to swap between two applications running on the computer at the same time – a word processor and electronic mail program, for example. This feature enables an item to switch to a particular application. In Windows, application switching can also be done by pressing the Shift+Tab key combination.

- **Control over application**

Some programs are better than others at controlling an application program. SAW has the most sophisticated facilities and can control the program directly by sending commands using 'dynamic data exchange' (DDE). Others have techniques like automatic scanning menus, hot-spots, and macros, which can be used to obtain good control over the application program.

Speech / sound actions

When an item is selected it may generate either *digitised* (recorded) speech or sound, or *synthetic* speech. Most programs have some degree of *speech control* so that the user can change the voice, volume or pitch of the sound. Inexperienced users may prefer the speech to be *synchronised* to the selection so that the access program waits until the speech is finished before starting scanning again, or carries out any other action. Some experienced users prefer it if the system is not synchronised so that they can start making the next selection while the system is talking.

Other actions

- **Auto branch back ‘pop-ups’**

All of the programs can link or branch from one grid to another. ‘Pop-ups’ can automatically branch back to the first set after a selection is made.

- **Multiple actions**

It can be useful if several actions can be performed when an item is selected: for example, the item might send text or generate speech and then branch to another grid.

- **Toggle / hold repeat**

Some programs can repeat a selection when the switch is held down (*hold repeat*) while with others (particularly mouse moves) the action repeats until the switch is pressed again to stop it (*toggle repeat*). Some programs can repeat any action, while others can only repeat particular actions such as cursor or mouse moves.

- **Delay / wait**

A delay facility means the program waits after the selection has been made, before starting scanning again. This gives the user time to prepare for the next selection.

- **Macros**

A ‘macro’ is a sequence of mouse and keyboard actions which is recorded and then ‘played back’ by pressing a keystroke combination or selecting from a menu. *EZ Keys* and *Wivik* have macros and other access programs can use the facilities built into word processors (e.g. *ClarisWorks* or *MS Word*) or add macros using a specialist program such as *Quickeys*.

- **Send to serial port / Environmental Control Systems**

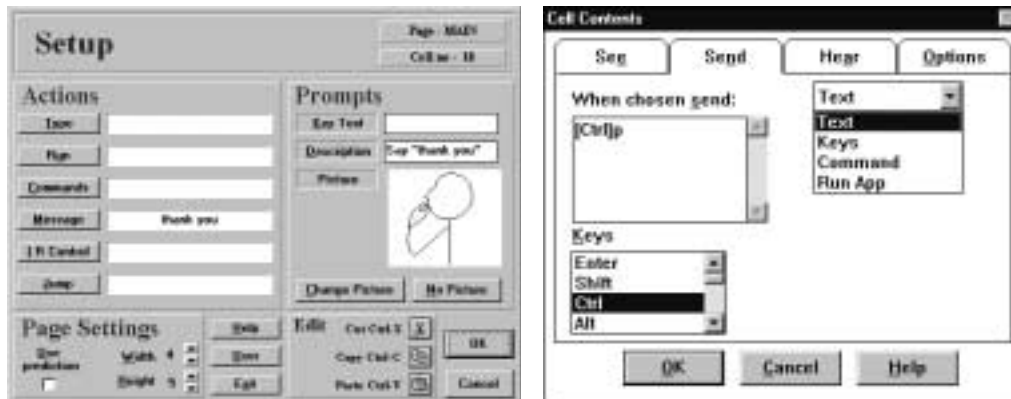
This facility can enable the access program to send keystrokes and commands to Environmental Control Systems (for controlling TV or audio-visual infra-red equipment, or mains powered devices); to other computers; or even to drive the CALL Smart Wheelchair.

7.7 Selection Sets

On-screen keyboards are of no use without suitable selection sets for the learning tasks. Some programs are supplied with a very small number of selection sets, whilst others have a huge range for different applications. Chapter 10 gives examples of how selection sets can be used for different tasks, and Chapter 11 lists the sets available for the range of on-screen keyboard programs.

Selection set editor

Figure 7-25 *HandsOff!* and *Point* selection set editors



Most of the on-screen keyboard programs have an editor so that selection sets can be created and changed to suit the user and the task.

Instant editing

Clicker and *HandsOff!* have ‘instant editing’ whereby an item or set can be changed immediately without having to load in a separate editor. With most programs, however, the editor is a separate program. The editor is opened, the set loaded and changed, saved, and then loaded back into the computer to be tested and used, and this can be a time-consuming process.

Editor accessible by user

It is very important that experienced users can edit the selection set using the special access program itself. In schools, it may be important to restrict access to settings and to avoid the possibility of them being altered inadvertently.

Import text file to selection set

This feature lets you load in a text file to the on-screen program, and then the program automatically creates a word-bank selection set using the words in the file. It can be useful in schools for quickly creating new word bank sets for particular subjects or tasks.

Selection sets supplied and available

All the access programs are supplied with a set of ready-made selection sets. The charts in Chapter 11 list the sets supplied with each program, and those which are available separately

7.8 Using on-screen keyboards with pointing devices

The majority of people using on-screen keyboards will select items from the grid using a mouse or pointing device. This section reviews some of the accessing issues and techniques to assist these users. Chapter 8 considers accessing techniques for pupils who use switches and scanning.

If the pupil has some problems selecting items from the screen accurately or quickly, first look at *Chapter 4 Accessing the Mouse*, which discusses how to:

- slow the mouse speed down to help improve accuracy
- turn off the mouse buttons so that items are not selected accidentally
- use extra switches in place of the mouse buttons, for user who cannot operate the standard buttons
- change the mouse pointer size or shape, for pupils who cannot see the standard pointer
- use the keyboard or switches instead of the mouse to control the pointer

Other common problems are described below.

“The pupil has difficulty hitting the small items on the screen...”

- Make sure the pupil has had enough practice to develop as good hand-eye co-ordination as they are capable of achieving.
- If there is still a problem, try slowing the mouse speed down (see Chapter 4).
- Try a different sort of pointing device. Some users may be more accurate (although also slower) with a joystick or ‘*MouseKeys*’ (see Chapter 4) than with a mouse or trackball.
- If there are still problems, increase the overall size of the selection set so that the individual items are bigger. If this takes up too much space on screen then keep the same size of selection set but reduce the number of items on it, and add extra selection sets with the extra items. So rather than having one large set with all the letters, keys, numbers, etc. you have letters in one selection set, numbers in a second and special keys in a third.

“The pupil is fairly accurate but often accidentally selects the item next to the one required...”

- Consider practice, mouse speed, pointing device and key size as above.
- Then try increasing the spacing between each item on screen, so that there is a ‘dead’ area between each item. Some programs (*Clicker 2*, *Wivik*, *EZ Keys*) let you specify a gap between each item for the whole selection set, whereas with others (*Discover:Screen*, *Ke:nx*) you have to manually move and re-size each item by hand. With a bigger gap you will have smaller targets – which require greater accuracy – unless you increase the size of the overall selection set so you may need to split the set up into several linked sets.

Figure 7-26 The effect of item spacing on item/text size



“The pupil can move the mouse pointer but can’t operate the mouse button...”

- Try a separate switch and interface operated by another control site (see Chapter 4).
- If no switch site is available, consider *dwell select*. With dwell select, the user moves the pointer over the item, and holds it steady for a set period of time (called the dwell period), and then the item is selected automatically. Most on-screen keyboards have dwell select built-in (*Wivik*, *EZ Keys*, *Discover:Screen*, *HandsOff!*, *Windows Point*) or you may be able to add the facility with an extra program like *Dragger* (described in Chapter 4).

“The pupil is fairly accurate but has difficulty keeping the pointer steady enough for the dwell period, to select the correct item...”

- Consider practice, speed, key size and spacing as above.
- Then try an on-screen keyboard with an ‘averaging’ selection facility (*EZ Keys*, *Wivik*). With ‘averaging’, you can move on and off the item and the computer ‘adds up’ the time spent on it and when the dwell period is reached it is selected. *HandsOff!* has another method for helping users who have difficulty staying on the target – you can define a ‘target size’ which is larger than the actual button or item and provided the pointer stays within the target, the selection is accepted.

“The pupil has difficulty seeing the mouse pointer on the screen...”

- Try increasing the size or changing the shape or colour of the mouse pointer (see Chapter 4 for ways of doing this).
- Use an on-screen keyboard which ‘highlights’ the item the pointer is on, as the pointer moves over it. *Discover:Screen*, for example, changes the background colour of the item so it is easy to see, whereas *Clicker* does not and it is noticeably harder to see which items is currently highlighted.
- Develop a procedure for using the on-screen keyboard and pointer (below).

Case Box

‘Michael’ described above still had problems losing the pointer because of his narrow visual field. The pointer size was increased using the *!Pointer* program. Alan Stewart, the specialist SEN/IT teacher in Highland Education Department, also suggested a procedure for helping navigate around the pointer, keyboard and predictor:

- type the first letter of the word
- take your hand off the Roller and leave the pointer where it is (so that you know where it is)
- look for the word in the prediction list
- if the word is not there, go back to the Roller and type the next letter, if known
- if the word is there, or you are not sure, go back to the Roller and move the pointer over to the word and select the desired word
- if you are not sure whether the word is there, use the right hand button to listen to any words which you think might be the one you want
- if you lose the pointer, move the Roller to flick the pointer to the top (or bottom) of the screen and then search along until you find it

“Writing is very slow using the on-screen keyboard...”

- Consider practice, mouse speed, pointing device and key size and selection technique as above.
- Make the selection set smaller so that there is a smaller distance to move the pointer (assuming the user is sufficiently accurate).
- Use a frequency of use layout which may be more efficient, or an alphabetic layout which may be more familiar to the user. A *frequency* of use layout for a pointing device user involves grouping the most commonly used keys together, either in the centre of the set, or like Figure 7-10 at the top left, so that they can be pointed to more quickly, with the less common ones located further away. Although the frequency of use layout is theoretically physically faster to use many users, especially young children, will be faster with an alphabetic layout because they are more familiar with it.
- Use acceleration tools like abbreviation expansion, macros or prediction; these are discussed in more detail in Chapter 10 in the section on *Writing and Recording Work*.
- If using dwell selection, reduce the dwell period.

7.9 Learning to use a point-and-click on-screen keyboard

Pointing and clicking requires good hand (or other body part) -eye co-ordination, which like any other physical task, takes time and practice to learn. It is easier to learn if the task is a) simple and b) fun. So rather than start off with a full scale ‘do it all’ on-screen keyboard which gives full access to the entire keyboard plus every function on the application program, keep it simple.

Start by using programs which give practice in pointing and clicking, preferably with reasonably large targets. Choose programs and activities which match your curriculum goals (like matching, sequencing or early number and literacy work) as well as developing point and click skills. Suitable programs might be:

- Multimedia, such as Broderbund’s *Living Books* or Edmark’s CD’s such as *Bailey’s Book House*.
- Early learning programs such as *My World*
- Drawing programs, such as *Kid Pix* or *Dazzle*
- Very simple on-screen selection sets with whole words or phrases which are known to the pupil – family names, for example, or words from reading books

Once the basic access skills have been learned, sets with smaller targets can be introduced alongside slightly more complex tasks such as simple word construction using letter selection sets, or topic-based whole word sentence building.

The complexity of the on-screen selection set should complement the complexity of the curriculum which it is being used to access: a basic lowercase letter set might be extended to include uppercase letters and punctuation, while more words would be added to a small topic-based whole-word set.

Adapting selection sets to match the curriculum is covered in greater detail in Chapter 10.

7.10 Which on-screen keyboard program is best?

It depends on what you want to do with it, which computer you use, who you are and how much money you have. Chapter 11 contains short reviews and comparative features charts of popular on-screen keyboards to help you compare the programs.

Programs Suitable for Independent Access

Some of the programs are particularly suitable for computer-literate people who want a wide range of access methods which can be 'fine-tuned' for the user and the task, plus facilities like word prediction and scanning menus to give fast independent access to the computer with maximum efficiency.

Useful features for independent access are:

- wide range of access methods and adjustments;
- selection sets designed for operating industry standard applications (like *MS Word*);
- text acceleration facilities such as word prediction;
- computer access features like mouse control, macros and quick menu/dialogue box access.

Often, these programs are relatively expensive because they have lots of specialised features and are aimed at a small niche market: they may be too expensive for many schools to consider. For example, *EZ Keys for Windows* is a text-based system designed to give an individual complete independent access to the computer, with many acceleration and voice output communication features, free software upgrades for life, and is priced at £999. It comes with selection sets for writing and computer control which cannot be edited or changed. *Switch Clicker* is a quite different product designed for classroom use. It can display text or graphics, has a more restricted set of access methods and limited computer control features, and selection sets are very easy to create and edit, and it costs £95 for a licence for five computers.

For Windows, *Wivik* is popular with text users who require independent access but are not particularly concerned with speech output. Many adults with spinal injuries and good head control use *Wivik* accessed with a head-controlled pointing device such as *HeadMaster* or *HeadMouse*. *EZ Keys* is often chosen by text users who have a communication impairment because the design of the speech output facilities enables users to easily talk whilst writing and using the computer. *SAW* is particularly useful for text users who need selection sets designed for particular applications, for speed and efficiency; selection sets are available for a wide range of wordprocessors, drawing programs, games and the Internet. The *Discover* range, previously available only on Macintosh, is now being developed for Windows and is suitable for a very wide range of users and purposes. As well as providing good access methods and control over the computer, *Discover* has excellent screen markers or hot-spots for adapting application programs for switch users. *Windows Switch* and *Point for Windows* are less expensive yet still give independent access, albeit with fewer features than some of the other products. The *Clicker* range can be used to access the computer but at the present time is more limited – *Switch Clicker Plus* for PC does not have mouse pointer control, for example. *HandsOff!* is a new inexpensive product with a wide range of access methods.

For the Macintosh, the *Discover* products offers a full range of control methods, selection sets and access facilities for a wide range of users with different access needs. *Clicker Plus* is suitable for point-and-click users who do not need the extensive features of *Discover*.

For Acorn, (*Switch*) *Clicker Plus* and *2* are available. They have good computer access features including mouse control and links to the *Penfriend* word predictor, but some facilities like autoscanning menus are not provided.

Programs Suitable for Classroom Use

While the more specialised access programs are suitable for older children who need to work more or less independently throughout the school day, some are less appropriate for young children or pupils with learning difficulties.

Some programs have a small number of selection sets designed for computer access (*EZ Keys*, *Wivik*) and it is difficult or impossible to change the contents of the selection set to suit the pupil or the learning task. *EZ Keys* cannot display graphics in the selection set and so is not appropriate for non-readers.

The settings in the more specialised access programs are usually deliberately designed to be easily accessible to the user which is an advantage if the user wants complete control, but could be a disadvantage in school.

Useful features for a system for classroom use are:

- text and graphics display;
- speed and ease of changing and creating selection sets;
- availability of other ready-made selection sets for particular programs, tasks and groups of pupils;
- the teacher can restrict access to program settings;
- the pupil can click on an item to hear a spoken prompt without selecting it;
- low cost.

The *Clicker* series is very popular in schools because of price, ease of use and availability on all three platforms – Acorn, Windows PC and Macintosh. *Clicker* is designed for general classroom use as well as for pupils with special educational needs so is a good choice for mainstream schools. It is particularly easy to edit and create selection sets so that new word bank grids, for example, can be created ‘on-the-fly’ to suit classroom activities. There is excellent control over presentation of the selection set – text and colour can be defined and symbols and graphics displayed, and there are several packs of ready-made selection sets (*Clicker Resources*) available. *Windows Switch* and *Point for Windows* are also low cost, flexible and effective classroom resources. Editing selection sets is slightly more involved but they have some features which the Clickers do not (see the reviews in Chapter 11). Programs like *EZ Keys*, *Wivik* and *Softype* are less suited to primary school use because of their higher cost. *EZ Keys* is, however, popular with secondary age school pupils who need a portable text-based writing and communication tool.

The *Discover* products for Macintosh and PC are also popular in schools because they have: a very wide range of access methods; many ready-made selection sets for popular educational programs; good control over speech; and computer control functions. The screen markers in *Discover* are particularly useful for adding scanning access to standard application programs. Their main disadvantage compared to products like *Clicker* is the relatively high cost.

7.11 Further Information

Web sites

ACE Centre - <http://www.rmplc.co.uk/orgs/acecent/homepage.html> Information and software. Publishers of SAW.

Advisory Unit. <http://www.advisory-unit.org.uk/> Information and resources about *Windows Switch*, *Point for Windows*, and other software.

Crick Computing. <http://www.cricksoft.com> Information and resources about *Clicker*.

Don Johnston - <http://www.donjohnston.com/> Information and resources for Discover, Ke:nx and other Don Johnston software and products.

MAPE. <http://www.chelt.ac.uk/guests/mape/> Micros and Primary Education web site. Information and software deals.

Meldreth Manor School. <http://www.rmplc.co.uk/eduweb/sites/meldreth/> Ideas and information for symbol users.

NCIP <http://www.edc.org/FSC/NCIP/> U.S. association with lots of useful information, advice on classroom applications, and reviews of software.

Widgit. <http://www.widgit.com/index.htm> Excellent site with lots of information about symbols, switch software and techniques for introducing switches and scanning.

Words+ <http://www.words-plus.com/mnframe.htm> Information on EZ Keys and other Words+ communication and computer access products.

Suppliers

ACE Centre, Ormerod School, Waynflete Road, Headington, Oxford OX3 8DD, Tel. 01865 63508.

Advisory Unit for Computers in Education (AU Enterprises Ltd) 126 Great North Road, Hertfordshire AL9 5JZ, Tel 01707 266714

Cambridge Adaptive Communication (CAC), The Mount, Toft, Cambridge CB3 7RL. Tel. 01223 264244.

Crick Computing, 123 The Drive, Northampton, NN1 4SW. Tel. 01604 713686.

Design Concept, 30 South Oswald Road, Edinburgh EH9 2HG. Tel. 0131 668 2000.

Don Johnston Special Needs Ltd., 18 Clarendon Court, Calver Road, Winwick Quay, Warrington, WA2 8QP. (Tel. 01925 241642)

FCD, 25 High Street, Woking, Surrey GU21 1BW. Tel. 014862 27844.

Inclusive Technology, Saddleworth Business Centre, Huddersfield Road, Oldham OL3 5DF, Tel. 01457 819790.

Liberator, Whitegates, Swinstead, Lincs. NG33 4PA. Tel. 01476 84391

REM (Rickitt Educational Media) Great Western House, Langport, Somerset TA10 9YU. Tel. 01458 253636

Semerc 1 Broadbent Road, Watersheddings, Oldham OL1 4LB, Tel. 0161 627 2381.

Widgit Software, 102 Radford Road, Leamington Spa, Warwicks. CV31 1LF. Tel. 01926 885303

References

Colven, D. & Detheridge, T. (1990) *A Common Terminology for Switch Controlled Software*. ACE Centre, Oxford. ISBN 1 85379 112 1.

Nisbet, P.D., Spooner, R.I., Arthur, E., Whittaker, P. (1998) *Supportive Writing Software for Pupils with Specific Learning Difficulties*. CALL Centre, Edinburgh, 1998.