

# Supportive Writing Technology

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# Assistive Writing Technology In The Classroom

The aim of the section is to give you a reasonably thorough understanding of the technology and why particular supportive tools can be helpful for writers with different difficulties.

Supporting writing programs and systems are tools and, like any tool, they require instruction and practice if they are to be effective.

Therefore, a teaching programme should be planned and delivered to develop the pupil's skills with the supportive writing technology. Many users of supportive writing tools will be reluctant writers and so it is even more important to plan the curriculum carefully to avoid failure and damaged motivation. There is also some evidence to suggest that the technology is only effective when the learner can use it independently, without support from the teacher or classroom assistant.

One of the most important techniques for developing writing skills - whether using pencil, simple word processor or processor with support - is to give a context for the writing. In other words, early or struggling writers should never be presented with a blank piece of paper or a blank screen and be expected to produce great things.

Standard techniques used with traditional writing tools involving worksheets, themes, and other materials to encourage interest and simulate the pupil's creativity, can be used equally effectively with supportive writing systems. Activities for using pictures and photographs to stimulate ideas are all helpful for teaching the use of writing, whether the tool is a pencil or a speech recognition system.

Pupils may have to complete a partially written word; copy a word into a particular place in a sentence; or complete a sentence - all techniques routinely used by teachers with paper worksheets.

For all these activities, speech output can help pupils identify words, make sense of sentences and reinforce learning. The activities themselves may be completed using the keyboard, with word banks, word prediction, or speech recognition.

# Word Processors

A word processor is the basic and most important tool for supporting writing on a computer. Most programs are designed for experienced users, and are of little value to primary school children. It is possible to configure the menus to create a clean, uncluttered screen, with only a few buttons to perform common tasks like changing font size, saving, loading and printing work. In general though, word processors are still overly complicated for younger users.

Word processors specifically designed for schools with a built-in word banks and speech are generally better solutions for primary and early secondary use.



## Mind Maps

Some pupils have difficulties thinking and planning their work in a linear order, and find it easier to think in terms of pictures rather than text. Ideas processors, or mind mapping programs, are graphical outliners. Topics can be added in any position on the screen, then moved around, linked and unlinked until the ideas are arranged in the correct order.

Pictures (and sometimes, sound) can be added to the outline. Different levels of sub-text can be created and displayed, and text added to each ideas box. Once all the text has been added and the structure is finalised, the program puts each idea, with text, into order ready for printing out.

The writer can flip between the graphical design and the linear text at any time to check and edit. Particularly appropriate for writers in late primary and secondary school, they are also popular in further and higher education.

**Tools to help organise writing are useful for pupils with writing difficulties because they:**

- Allow the writer to more easily plan, create and edit text in any order.
- Give a structure and scaffolding to the writing.

**Tools to help organise writing are worth investigating if:**

- The writer has difficulties working through a beginning-middle-end planning sequence.
- The writer has problems getting started.

**Things to look for in an organising tool:**

- Suitability for the writer and task.
- Ease of use.

# Talking Word Processors & Text To Speech

Talking word processors and Text To Speech output utilities enable students to hear as well as see their text. Speak as you type means that the computer echoes back letters, words or sentences as they are typed. Speak marked text lets the writer highlight a word, sentence or paragraph, and read it out.

Both types of auditory feedback can help writers to identify errors in sequencing of ideas, grammar and spelling in their compositions. Students can check their work through listening and following text. This makes it easier to identify and correct spellings errors and missing punctuation, or edit and add extra text.

Some word processors have both types of speech output built in, while others only have speak marked text. You can add speech output to mute word processors with a speech utility.

For primary school use in particular, a talking word processor is probably a better solution than adding a speech output utility to an ordinary word processor. The speech output utilities are more suitable where it is important to use a particular 'mute' word processor, or if speech is required with several applications – such as a word processor and email.

## Using Speech Output For Proof Reading

Poor spelling, grammar and lack of sentence structure can make text difficult to read. Speech output may help the writer to identify mis-spelled words, and remind and help him or her to add punctuation and capitals at the correct points.

Simple proofreading, where the text is highlighted and then spoken out, can be done with even the most basic speech output tools. The more sophisticated programs can read out the highlighted text by sentence or paragraph, and highlight each word as it is spoken to help the reader to follow the text.

Another useful technique is to use a talking word processor with a click and speak word facility. This lets the writer click on each word in the sentence, in sequence, to work out the position of full stops and other punctuation.

'Click and speak' is one of the most useful speech output facilities for this sort of application: it is much quicker and easier to just click on a word, than to first double click to highlight the word, and click on another button to speak the word out.

## Using Speech Output To Develop Spelling And Literacy Skills

Talking word processors can have considerable success in increasing reading and spelling abilities in children.

Speech output can also be used to help pupils who have difficulty reading, either because of visual, perceptual, or linguistic difficulties. Visually impaired users have accessed computers with screen readers for years, but it is only relatively recently that screen reader systems have been designed for people with reading difficulties.

The simplest method of speech output to read is to load a text file into the talking word processor, or use a speech output facility to read the text on the word processor, from a CD, or from the internet.

It is also possible to scan in material to from a textbook or worksheet, using OCR (optical character recognition) software to convert it into text that the computer can handle, and then read it out using the speech program.

Basic versions of standard OCR software are often supplied with the scanner and are adequate for many purposes, but often have difficulty converting unusual fonts or complicated lay-outs into readable text. The full versions of the OCR text programs are much better, but also more expensive. If you have a basic, 'lite' version of almost any OCR program, you can upgrade to the full version.

Many speech output tools let you easily adjust the text font and size, and text and background colours. When the programs are reading, they can highlight the current sentence and the word

being spoken, and the highlight colours can be chosen to suit the user. They also have study support tools for bookmarking and adding typed notes and voice 'annotations' (i.e. recording your own spoken notes), plus spellchecking and thesaurus facilities.

Such packages may be more expensive than a basic OCR program plus a talking word processor or speech output utility, but they offer many more features. Someone who only needs speech to read the screen occasionally might be satisfied with a talking word processor, but students who need to study a lot of text should definitely consider one of the specialist packages.

## **Talking Word Processor And Speech Output Summary**

**Talking word processors and Text To Speech tools are useful for pupils with writing difficulties because they:**

- Confirm the writer has typed the correct word, or sentence, as it is written.
- May help the writer to spot mis-spellings.
- May help with sentence structure.
- May help the writer to improve sense and meaning.
- May help the learner read text from the computer more effectively.
- Can be used to help improve a learner's basic literacy skills.

**Talking word processors and Text To Speech tools are worth investigating if:**

- The writer misses out punctuation.
- The writer produces poorly structured sentences, or text which does not make sense.
- The writer has difficulty reading back what they have just written.
- The learner has poor phonic understanding and blending skills.

**Things to look for in a talking word processor or Text To Speech tool:**

- Clear speech.
- Quick operation by mouse and keyboard.
- 'Click to hear word' facility.
- Colour and font control.
- Highlighting of word and sentence as it is spoken.
- Study support tools (for learners who want to use the system for reading and study).

# Spell Checkers

Most pupils who can benefit from supportive writing technology have some sort of difficulty with spelling. Spellcheckers can help with highlighting suspect words and hopefully offering the writer the correct spelling. Another valuable aspect of computer spellcheckers is that they confirm correct spellings so the writer does not waste time checking them.

## How Spell Checkers Work

An electronic spellchecker works by comparing each word typed with the words in its dictionary. It then indicates whether the word is in the dictionary or not. If the word is not recognised, it offers a list of likely alternatives. If the correctly spelled word is in the list, the writer selects it by clicking with the mouse, or by using the keyboard.

If the spellchecker does not recognise the word, it does not necessarily mean it is wrongly spelled - it may just not be in the dictionary (as in names of people or places). Secondly, the checker may accept some words which are mis-spelled because they are other words - for example, sum for some, here for hear, or who for how.

Research suggests that 26 to 40 percent of spelling errors made by writers with spelling difficulties will not be identified as an error by their spellchecker, because they are in fact correctly spelled other words.

Even if the spellchecker has identified a word as being mis-spelled, it may not be able to offer the correct spelling. The poorest spellcheckers are only able to pick up simple mistakes in typing, and the common spelling mistakes made by an average writer (e.g. receives instead of receive). Most can tackle errors such as letter reversals (anb instead of and), transpositions (teh instead of the) and straightforward phonetically spelled words (lite instead of light).

Spellcheckers specifically designed for school use, or for people with spelling difficulties, may be able to cope with more complicated mis-spellings that contain a combination of different types of error (e.g. exasperate, instead of exasperate, or 'prakts' instead of 'practice'). A few specialist spellcheckers can also suggest the correct word from split words (e.g. con tans for contain) and more bizarre mis-spellings (e.g. scnis for science or simn for swimming).

It is extremely important that the spellchecker suits the pupil's particular difficulties and the learning task: a spellchecker which cannot offer the correct word in response to the pupil's errors is as much use as a calculator that gets sums wrong.

### The effectiveness of a spell checker depends upon:

- the size and content of the dictionary, and whether it contains the words the student is using.
- the effectiveness of the program in working out valid replacements.
- the nature of the mistakes made by the user - are they simple typing errors, 'ordinary spelling errors,' does the word still sound like the intended one, or does it look quite bizarre, bearing little phonic or visual resemblance to the correct spelling?
- the 'user interface' - there is no point having a very effective spellchecker if it is too slow or confusing to use.
- extra facilities such as showing the word in context, giving examples of use, or speaking out words in the spellchecker list. So, while one measure of a spell checker is its ability to spot misspelled words and suggest correct replacements, that is only part of the story.

## Presentation And User Interface

Some spellcheckers tend to offer short lists of words while others offer a long list. Short lists are generally better because there are fewer words to search through, and because the writer is less likely to choose the wrong one.

The disadvantage with a short list is that the correct word might not actually be offered, if the spelling is quite unusual. Longer lists might be more effective if the pupil has good word recognition skills and can identify the required one easily from a long list. Early learners or

pupils with poor word recognition skills may be better with only a few suggestions. Talking spellcheckers can help the pupil identify the word in the list of suggestions.

## Speech Output

Some spellcheckers can speak out the words in a list of suggestions and this can help the writer recognise the correct word. It is also easier to spot the correct word if the writer can see how it fits in with the sentence in the text.

Some spellcheckers automatically move the text window within the document so you can see the sentence, while others show a few words before and after the text within the spellchecker window. Some spellcheckers also have an option to give explanations of the word meaning.

## Spellchecker Summary

**Spellcheckers are useful for pupils with writing difficulties because they:**

- Highlight possible mis-spellings and (may) offer correctly spelled suggestions.
- Confirm likely correctly spelled words.

**Most writers find spellcheckers useful if:**

- The writer can write fairly quickly and easily.
- The writer can spell the majority of words used correctly (i.e over 50 per cent at least).
- The writer can recognise the correct spelling of a word when offered it by the checker (with, or without speech output assistance).
- The use of a spellchecker alone may improve spelling accuracy. Otherwise, the writer may need other support tools as well as the checker.

**Things to look for in a spellchecker:**

- The checker offers the correct spelling for at least two thirds of the writer's errors.
- An option of marking or highlighting suspect words as they are typed.
- Speech output, if the writer has difficulty spotting the correct word in the list.
- A checker which offers a fairly small list of words, with the correct word near the top.
- Quick operation by mouse and/ or keyboard.



# On-Screen Word Banks

Word banks are grids or lists of whole or part words, or phrases, that are presented on-screen. The learner selects a word with the mouse, keyboard or switch, and the word is typed into the word processor.

Many word banks have speech output so that the writer can listen to the word to confirm it is the correct one before selecting it.

Word banks can also be presented on an overlay keyboard, which are useful where the learner has difficulty operating the mouse or pointing device.

## Word Banks And Early Learners

Word banks provide a useful technique for introducing pupils to word processing and writing using a computer. Words, part-words and whole phrases can be stored in a cell in a grid and written into the text by clicking on the cell, or by pressing the key on the on-screen keyboard.

Since children normally learn to recognise words before they are able to construct and spell them, word banks help pupils get experience and success manipulating words and generating meaningful text from an early stage of their literacy development.

Word banks are excellent tools for sentence construction and activities where the vocabulary is predictable and limited. When the classroom activity involves spelling or use of a wider vocabulary than can be effectively displayed on word banks, then other tools are needed.

## Word Banks For Writers With Spelling And Writing Difficulties

Writers with spelling difficulties can use word banks to write longer or more difficult words. The word bank can also help to generate ideas, encourage the use of new vocabulary and can remove anxieties about spelling. Pupils with difficulties in spelling, or physical difficulties resulting in slow laborious typing, can work faster by selecting whole or part words.

## Word Bank Summary

**Word bank programs are useful for pupils with writing difficulties because they:**

- Enable a learner to write with whole or part words, pictures or symbols.
- Allow pupils to write using word recognition skills rather than having to spell.
- Let writers concentrate on sentence content and structure without worrying about spelling.

**Word bank programs are worth investigating if:**

- The writer is young or at a very early stage of literacy.
- The writer has difficulty handling words.
- The writer needs key word prompts to start writing.
- The writer needs a bank of difficult words.

**Things to look for in a word bank program:**

- Quick creation and editing of word banks.
- Ease of use.
- Flexible font and colour control.
- Activities and examples supplied with the program.
- Symbol handling facilities, for those who need them.
- Symbol libraries supplied with the program.
- Switch access, for writers who cannot manage the mouse/pointing device.



# Word Prediction

Word predictors analyse words as they are written on the computer and try to 'predict' the words that the pupil is most likely to want from a dictionary.

When a pupil types a letter, word prediction programs offer a list of the most common words beginning with that letter. If the required word is on the list, the pupil selects it with mouse or keyboard. If the word is not on the list, the pupil types the next letter and a different choice of words is offered.

Word predictors can reduce the number of keystrokes needed to type by up to 50 per cent, and so pupils with physical disabilities use them to reduce effort.

Word prediction can also help people with spelling difficulties because the writer only needs to type the first few letters of the word, and then select it from the list of words offered.

Word predictors can result in an increased vocabulary; correct use of word endings; improved sentence structure; greater confidence, self-esteem and motivation to write.

## Word Prediction And Early Writers

Prediction is usually thought of as a relatively sophisticated writing technique for older learners but it can also be very effective with younger pupils, if viewed as a type of word bank.

A starter dictionary for young pupils might have less than 100 words, matched closely to the writing task, to make sure that the word appears in the prediction list.

Early writers, or those with word recognition difficulties, will be more successful with the word predictor if the dictionary is prepared with only those words which they need.

## Word Prediction And Writers With Spelling And Learning Difficulties

Word predictors may help writers with spelling difficulties, provided the writer can type the first one or two letters of most words correctly; and select the correct word from the list.

Like any supportive writing tool, prediction will suit some writers but not others. Using a predictor does require concentration and some degree of literacy. The writer must pay attention to the spelling of each word as it is written.

Prediction may also slow down the pupil and can break the flow of thought and writing. For this reason, it is perhaps most useful for pupils who are not quick typists and who have significant spelling and reading difficulties.

Word prediction programs can also help writers with more general learning difficulties, who have significant problems with all aspects of writing.

## Introducing Word Prediction To A Writer

Most word predictors have several options and so need careful setting up before they can be used productively.

When prediction, or any other supportive writing tool, is introduced to a writer with spelling difficulties, it is helpful to use short exercises which let the pupil concentrate on learning to use the tool.

It is absolutely essential that the word predictor contains the words the writer will need, and that they are offered as quickly as possible. Many programs will let you add new words and edit the dictionary reasonably easily and quickly.

The base dictionary can be as small as 500, 100 or even zero words. Writers in later primary school, and early secondary pupils with spelling difficulties will need a fairly large dictionary of 2,000 to 15,000 words – many default dictionaries are available.

## Word Predictor Summary

**Word predictors are useful for pupils with writing difficulties because they:**

- reduce the number of keystrokes needed for typing.
- can offer the writer a list of appropriate, correctly spelled words.

**Word predictors are worth investigating if:**

- the writer is a slow typist.
- the writer has to think about the spelling of most words.
- the writer can usually get the first few letters of the word correct.

**Things to look for in a word predictor:**

- effective word prediction.
- suitable standard lexicons for the writer and the topic / good dictionary editing tools.
- other support features: speech output, built-in spell checker, on-screen keyboard, links to switch operated special access programs.

# Speech Recognition

Speech recognition has great potential for helping pupils overcome the barriers presented by their spelling and writing difficulties. A speech recognition program takes spoken commands and dictation and matches the sound to the correct word or command.

## Speech Recognition For Learners With Writing Difficulties

Speech recognition systems have been used by people with disabilities for several years. They have proved effective for writers who have problems with a standard keyboard because of arthritis, repetitive strain injury, or spinal injury. They have also been used by writers with reading or spelling difficulties, and visual impairment.

Speech recognition programs usually need some training before they can be used productively, and the training involves reading a relatively large amount of complex text, so it is only suitable for good, motivated readers.

## Digital Recorders And Speech Recognition

Digital recorders can also work with speech recognition programs. The writer can dictate into the recorder, then plug the recorder into the computer, load up the speech recognition program, press 'Play' on the recorder, and sit back while the computer converts the recording into text on screen.

This approach has obvious advantages for schools: although digital recorders are expensive, they are a lot cheaper than laptop computers, so several students could use their own recorders and then download, correct, edit and print out their work on a desktop PC.

It is not a suitable approach for writers who have difficulty composing sentences and structuring their work or who have poor short term memory skills.

## Speech Recognition Summary

**Speech recognition systems are useful for pupils with writing difficulties because they:**

- let the student write without having to type or worry about spelling each word.

**Speech recognition systems are worth investigating if:**

- the writer has reasonable oral and general literacy skills, but poor spelling; the writer has reasonably consistent speech.
- the writer is highly motivated to learn to use the system.
- there is adequate technical support and staff time to support the writer during the initial training.

**Things to look for in a good speech recognition system:**

- a program that works on your machine (some systems need a fairly new and powerful computer).
- ease of installation, training and use/accuracy and reliability.
- multiple voice files so that several writers can use it.
- Text To Speech output of written text.
- facility to play back (and store) a recording of the dictated speech.
- correction of errors and mouse and computer control by voice (for writers with physical access difficulties).

# Assessment And Provision Of Supportive Writing Technology

## Barriers To Learning

The first assessment task is to identify the 'barriers to learning', which fall into three categories.

### **Individual needs and abilities of the user might include:**

- age, cognitive level and overall literacy skills.
- word recognition skills.
- handwriting quality and speed.
- spelling skills & the particular nature of any difficulty.
- vocabulary and language.
- planning and organisational abilities.
- visual/perceptual abilities.

### **Environment or conditions in which learning takes place:**

- teaching and learning support staff resources.
- staff skills and training opportunities.
- technological resources currently available to the writer.
- technological resources which could be made available to the writer.

### **The nature of the learning task:**

- the curriculum level/ stage.
- the task (early literacy activities, creative writing, reports etc).
- location – in one class in primary, in several classes in secondary school, on field trips, in examination situations.

## Collect Background Information

Most of this information can be gathered by talking to the learner's teacher, classroom assistant, parents and educational psychologist and from looking at previous reports and samples of school work.

### **Such information should summarise:**

- the nature of the difficulty.
- how it effects the learner's access to the curriculum.
- the impact of other techniques and technologies which have been tried.
- how the staff and parents hope technology will help.

The process of gathering and recording this information helps to ensure that all those involved who should be consulted, are consulted.

### **Other basic questions to consider are:**

- Is the writer likely to need a laptop computer or would access to a desktop system be appropriate? Or both?
- What other sorts of computers and software are already in use in the school – if the school uses Macs, avoid suggesting software which only runs on Windows.
- Does the writer have a known visual impairment which precludes a laptop with a small screen?
- Are there any known physical difficulties which might influence the choice of keyboard or mouse?

## Examine Samples Of Work

Request some representative samples of work from the school: text handwritten by the writer; text written independently on a computer; and text dictated by the writer and scribed by a helper. Look at the type of spelling errors: are they 'real word errors' which are not picked up by a spell checker, but could be identified with talking word processor or speech output program? Are the first one or two letters of the words usually correct, in which case a word predictor is worth investigating?

Examine the sentence structure and punctuation. If the sentences are poorly structured, add speech output to the list of technologies to be evaluated. Compare the length, vocabulary and language used in the handwritten, typed and dictated texts – if the dictated text is significantly better, the writer may need support from a word predictor or speech recognition system.

## Assessing Laptops

**In many cases you will be considering a low cost laptop computer and if so, it is worth checking if the writer has preferences about:**

- text size, style and colour, and background colour.
- screen size and number of lines of text that can be displayed on screen.
- keyboard size, colour and font – e.g. are lower case or high-contrast stickers better?
- physical size and weight – can the writer carry it, get it from bag to desk, and switch it on?
- appearance.

## Evaluation

Assessment for supportive writing technology is not an exact science, and so it is unlikely that the assessment process will identify 'the solution'. It is much more likely that several tools, software programs, and teaching schemes will be identified as being potentially helpful.

## Training Users

If there is a group of pupils requiring teaching in the same type of skills, training as a group can save time. For teaching keyboard skills to a group of pupils, it may be cheaper and more convenient to use a stock of portable computers than desktop computers (unless the school has a computer lab).

In some schools pupils have access to computers during breaks with supervision from classroom assistants or older pupils. Some pupils may have a computer at home which they can use to improve their keyboard skills.

# Additional Information

## **Document Information:**

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