



Llywodraeth Cymru  
Welsh Government

# Assistive technology

Guidance for teaching practitioners to support learners with specific learning difficulties

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## Guidance

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# Assistive technology

<b>Audience</b>	Local authorities, early years providers, mainstream schools and further education providers.
<b>Overview</b>	This guidance provides information for teaching practitioners to make decisions about how they can help a learner with specific learning difficulties (SpLD) through the integration of assistive technology into mainstream school activities.
<b>Action required</b>	Practitioners should consider this advice to help identify effective assistive technologies for learners who may have SpLD.
<b>Further information</b>	Enquiries about this document should be directed to: Additional Learning Needs Branch Support for Learners Division Infrastructure, Curriculum, Qualifications and Learner Support Directorate Welsh Government Cathays Park Cardiff CF10 3NQ Tel: 029 2082 3003 e-mail: <a href="mailto:Additionallearningneedsbranch@wales.gsi.gov.uk">Additionallearningneedsbranch@wales.gsi.gov.uk</a>
<b>Additional copies</b>	This document can be accessed from the Learning Wales website at <a href="http://learning.gov.wales">learning.gov.wales</a>

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# Section 1

## Introduction

The purpose of this document is to help teaching practitioners make decisions about how they can help the learner with specific learning difficulties (SpLD) through the integration of assistive technology into mainstream school activities. In particular, it has three clear objectives.

1. Explain how appropriate assistive technology and specialised equipment can be used to support and enhance the education of learners with different/or overlapping SpLD needs.
2. Provide a rationale for using specific types of equipment or ICT packages to support specific learner's needs.
3. Provide a guide on how to judge the quality, usefulness and accessibility of assistive technological aids and specialised equipment, and provide links to some open source and free assistive technological aids that exemplify some of these qualities.

The Welsh Government commissioned Cardiff-based Do-IT Solutions Ltd to undertake this work, to provide a resource that teaching practitioners and parents/carers could use to help identify resources, and understand how they would help as part of the support for learners with SpLD.

Over the past five years, there has been a phenomenal increase in the amount of technology available to help learning, and in particular, that which will aid those with SpLD. While it would be wrong to highlight any particular event, the introduction of the first iPad in April 2010 can certainly be counted amongst the contributors.

That does not mean there was not much before that time. However the introduction of the iPad, and subsequent developments made technology accessible, available and appealing. It also became a draw for developers to create software at a level not previously experienced for the humble laptop.

Add to that the wide availability of fast broadband, including the introduction of its mobile version, 4G, in February 2012, and we can see a rapidly changing landscape. The by-product of the faster speed is that documents can be stored online, and services can be provided in real time.

All this has had a huge potential impact on those with SpLD. However, until the technology becomes mainstream, until people know it is there, can access it, and know how to get the most from it, it will remain only a 'potential'.

This is not to suggest that assistive technology is the much-needed solution for those struggling in an educational environment due to their difficulties. Instead, it should be seen as a supporting mechanism, one that forms part of the practitioners' toolbox that can supplement other teaching activities, be they in the classroom or at home. In the same way one would seek to understand the pedagogic principles behind new teaching resources, so too assistive technology needs to be understood. In particular, it needs to be understood how it facilitates some aspects of learning, rather than provide the learning itself.

Parents/carers are very much part of the learning process, especially when the assistive technology will also be used at home. For this reason, it is suggested that this document can be shared with parents/carers, to enable their understanding and maximise support for the learner. However, as with all aspects of learning, it is best if the parent/carer can work in collaboration with the educational provider.

This resource can be used in several ways, depending on your needs and your prior knowledge.

In principle, the first part refers to the background information that may be required to understand the approach, which is needs-based rather than label-based. This may be considered to be parts 1 and 2 of the objectives above.

The second part of this guide is a section-by-section introduction to the key areas of assistive technology, and how they can help with specific areas of support. This reflects the needs of the third part of the objectives of this document. Examples of software have been referenced within each key area. In many cases Welsh-medium versions may not be available.

## **How to use this guide**

### **Will it help me support learners with SpLD?**

Yes, without a doubt. Within a well-constructed support programme, assistive technology has a very clear role. Do not assume it will solve everything, and be prepared to do regular reviews of effectiveness as you would do with an individual education plan (IEP).

### **Will it help me understand their needs?**

Within the document is a needs analysis section, which will help you understand the learner's strengths and weaknesses in key areas that can be supported by assistive technology. However, it is important to remember that it is not just the software that matters – it is the guidance of how to use it that can be the key to how much it helps.

### **Will it tell me what software to buy?**

The one thing you will **not** find in this document is a long list of recommended software. Why? Because as soon as we say 'This is the best' a better one will come along. As soon as we say 'This is not good because XYZ' the developers will change the software.

But that does not mean there are not lots of helpful references throughout. Indeed, we have tried to ensure we have given signposts to plenty of sources with up-to-date information, and in particular those that are free. A list of these potential resources can be found in Annex B (page 44).

### **Will it give me instructions on how to use it?**

There are too many types of software, changing far too often, to consider trying to make a comprehensive guide on all possible types of software. The focus here is to identify the key types of assistive software, and how it can help. However, YouTube holds a vast amount of information on assistive technology. Guidance is given to help find what you need.

### **Will it cost a lot to implement?**

Over the past few years, the gap has closed between the free and commercial software capabilities, such that in many cases, a free online version may be better. Where appropriate, both options are specified, meaning that even if the paid version is the better option, you can still use the free one while waiting for funding.

### **How can I be sure that assistive technology is the right solution?**

Part of the needs analysis process is to understand the areas that need support. But in doing so, a review process should be incorporated. Indeed, it may be argued that frequently it is not access to the software that counts, but the access to appropriate training. That is, it is not what you have but how you use it that counts.

As mentioned elsewhere, do not regard assistive technology as the solution. It is one of the tools that can help those with SpLD unlock their talents, and often enhances their independent learning. However, it should always go hand-in-hand with every day classroom activities, and be monitored for effectiveness as many learners with SpLD will require ongoing support.

## About assistive technology

According to the British Assistive Technology Association (BATA):

Assistive technology is any product or service that maintains or improves the ability of individuals with disabilities or impairments to communicate, learn and live independent, fulfilling and productive lives.<sup>1</sup>

The BATA definition above provides a wide enough definition that can encompass the current needs. Put another way, you will always need assistive technology to access content, as opposed to 'learning software' which is only retained while the content is being learned. It can then be discarded.

However, how the term is used, and the effect the technology has on any individual, will depend upon not only the specific needs of their learning difficulty, but also the context.

Therefore the software that you will find mentioned here is not subject specific, or even time specific. It is about providing additional support to access the curriculum for those who may otherwise have problems due to the nature of their SpLD.

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<sup>1</sup> [www.bataonline.org/further-assistive-technology-definition](http://www.bataonline.org/further-assistive-technology-definition)



## **Specific learning difficulties – a summary**

The five SpLDs' referred to in this document are shown below, along with their key characteristics. How some of those characteristics may be supported will be shown on subsequent pages. Full descriptors of SpLD can be found in the *Specific learning difficulties framework* (2015) at <http://learning.gov.wales/resources/collections/spldframework?lang=en>.

### **Attention deficit hyperactivity disorder (ADHD)**

ADHD is the umbrella term to describe a condition that affects individuals' attention, concentration, impulsivity, activity levels and memory (ADD is included in this).

### **Developmental coordination disorder (DCD)**

Developmental coordination disorder (DCD), also known as dyspraxia in the UK, affects fine motor and gross motor coordination and balance skills.

### **Dyscalculia**

Dyscalculia is a condition that primarily affects the ability to acquire arithmetical skills.

### **Dyslexia**

Dyslexia is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling.

### **Speech, language and communication difficulties**

Specific language impairment (SLI) is a developmental disorder that may affect the learner's ability to speak, understand, and communicate effectively.

# Assistive technology from a cognitive difficulties perspective

The traditional approach to assistive technology and SpLD is for a list of technologies to be provided that demonstrate how they can help someone with a given SpLD. However, the table below attempts to suggest that the difficulties of any individual are rarely confined to one narrow area. (Note that 'Yes' indicates what may be referred to as a defining characteristic.) Thus each of the Specific Learning Difficulties considered here may have reading and writing difficulties associated with them that will benefit from, for example, text-to-speech assistive technology. However, the reasons for needing it may vary.

By focussing on the cognitive impairment rather than the label, it is possible to provide all round appropriate support, which automatically encompassed co-occurrence of difficulties.

Please note that as with all aspects of SpLD, it is important to understand the individual. The table below is intended to suggest how frequently individuals may have difficulties outside the areas usually considered, rather than suggest that every individual with that condition has that difficulty.

Cognitive difficulty	Dyslexia	Dyscalculia	Dyspraxia/ DCD	ADHD	SLI
Reading and writing	Yes	Sometimes	Often	Often	Often
Mathematics	Sometimes	Yes	Sometimes	Sometimes	Sometimes
Memory	Often	Often	Often	Sometimes	Sometimes
Attention and concentration	Sometimes	Sometimes	Sometimes	Yes	Sometimes
Motor difficulties	Sometimes	Sometimes	Yes	Sometimes	Sometimes
Language	Sometimes	Sometimes	Sometimes	Sometimes	Yes
Communications	Sometimes	Sometimes	Sometimes	Sometimes	Yes

## Assistive technology from the software perspective

The table below shows some of the ways in which technology can have diverse uses, and should not be seen as being used for a single function or a single cognitive difficulty only.

How technology can help	Text-to-speech	Speech-to-text	Concept maps	Memory related software
<b>Reading</b>				
Reading reports and text books.	✓			
Reading single words.	✓			
Needing to re-read sentences for meaning.	✓			
Difficulty in remembering long text.			✓	
<b>Writing</b>				
Difficulty with written work.		✓		
Takes longer than average to do written work.		✓		
Uses poor, sometimes bizarre, spelling.		✓		
Difficulty reading their own writing.		✓		
Has problems explaining ideas and concepts.			✓	
<b>Memory</b>				
Difficulty remembering deadlines.				✓
Has difficulty remembering new words.	✓			✓
Has difficulty following instructions.			✓	✓
<b>Motor</b>				
Poor handwriting.		✓		
<b>Other</b>				
Finds it difficult to organise themselves.			✓	✓
Has low self-confidence.	✓	✓	✓	✓
Poor attention and concentration.	✓	✓	✓	

Based on Smythe, I (2014) *Assistive technology* Dysvet Module 4.  
 Web access: [www.dysvet.eu/en/e-books.aspx](http://www.dysvet.eu/en/e-books.aspx)

## Assistive technology from the literacy process perspective

Another way to look at the technology, to understand how it can be used, and how to develop the needs analysis, is to look at a specific task, break it down, and then identify what assistive technology can be assigned to support each of the areas identified.

In the example below, the task is writing, or more specifically writing a piece of coursework. For each of the five key areas (and their sub-areas) a piece of assistive technology has been named, with an example of that software. For further details, please see the section on needs analysis and those related to the specific software.

Process	Assistive technology	Example
<b>Brainstorming and planning</b>	Concept map	PowerPoint, Popplet
<b>Text writing</b>	Dictation	Dragon
	Templates	Various
	Spelling	MS Word, Ghotit
	Grammar	Ghotit, Gingerly, Grammarly
<b>Proofreading</b>	Text-to-speech	WordTalk, Claroread, TextHelp.
<b>Timing</b>	Various	Remember the milk, Stickies, smartphone alarms
<b>User preferences</b>	Colours and fonts	Software dependent

## **Additional considerations**

Before making a purchase, or selecting a specific free version, there are a number of considerations. The few identified here are not intended to be exhaustive, but highlight some of the parts that may need to be considered.

Under equality and diversity legislation, all learners should have access to resources that can reduce any disadvantages that they may have due to their disability. This would include those with SpLD, and clearly has an impact upon the access to assistive technology.

Every situation is different, and decisions will be based upon funding, needs and context. Here are some of the dilemmas one may be faced with.

### **For the individual, or across the whole educational setting**

Frequently, the cost of a licence for a whole educational setting can be little more than buying it for 10 individuals.

### **Annual licence or perpetual licence**

Perpetual licences often restrict the number of updates available, but can be easier since they do not have to appear in the budget for each year.

### **Online or offline**

There may be security/access issues with online sites. But they do overcome the problem of 'forgotten' homework, since it will not be lost or misplaced.

### **Commercial or free**

The commercial versions usually have additional functions. But as will be shown later, they are not as great today as they were in the past.

## **Assistive technology and online support**

A quick search of the internet highlights some courses available around 'assistive technology', such as the MSc course at Coventry, or the City & Guilds Level 2 Certificate in supporting users of Assistive Technology. However, these tend to be for all disabilities, and in particular medical disabilities rather than SpLD. Currently there are no courses available on Coursera or Alison online learning systems.

However, YouTube offers a wealth of information about assistive technology if you can identify the key areas you are interested in. (N.B. Always check the date a video was put up. There may be better software than those shown, though older ones can still inspire, and if the software still exists, it will now be more robust.)

## Section 2

### Text-to-speech

#### Text-to-speech and SpLD

It does not matter what the SpLD is, if you have a reading and writing difficulty, then you should be able to access, and would benefit from, text-to-speech (TTS) software. That is, it should supplement but not replace other forms of support and intervention.

The most evident SpLD where TTS is very important is dyslexia, which by definition is a reading and writing difficulty. Using TTS will help overcome some of the difficulties associated with this.

However, if the SpLD is more closely related to ADHD, then the cause of the problems may be different (e.g. attention and concentration rather than phonological awareness) but the symptom of a difficulty in reading and writing remains. Therefore, the use of TTS would seem obvious in the classroom and at home.

It is important to establish whether there would be a potential problem or significant disadvantage in examination provisions if the system or support changes from that which is normally used by the learner. It is important to note that learning providers must apply to the awarding body for access arrangements and reasonable adjustments for learners' who may require assistive technology and/or support in an exam.

Speech and language impairment may also significantly impact upon the pleasure of reading. Using TTS would help relieve some of the issues.

Although TTS is not normally associated with dyscalculia, there are many occasions when a maths problem is presented in words rather than symbols. For this reason, those learners with this particular SpLD may also benefit in certain circumstances from TTS.

#### How TTS helps

There are many uses of TTS, all of which may be considered to be independent of the SpLD of the individual. Listed below are some of the more important uses.

- Reading web pages.
- Reading online and offline web e-books.
- Reading electronic documents (Word, PDF, etc.).
- Proofreading one's own work.
- Checking pronunciation of a word or phrase.
- Feedback as you type at the level of the sentence, the word or letter-by-letter.
- Reading e-mail and chat.
- Reducing eyestrain.
- Listening to text while doing other tasks, such as travelling on the bus or train.
- Assisting the study of an additional second language.
- Using social media.

## The main types of TTS, and examples

Outlined below is a simple list of the primary free and commercial software that is widely used in the UK. This is not an exhaustive list, nor is the inclusion of any software intended as an endorsement of that product. However, it covers most of the contexts where TTS is used, and most of the more popular versions with reasonable reviews. However, there are many other versions available, particularly for browsers and online.

The browser-based versions have three main forms.

1. Locally installed (in the browser) with a local voice, which is usually the voice of the operating system.
2. Locally installed with a server voice – these are increasingly popular as a greater range of voices can be used. However, currently there are no Welsh voices available for browser-based services.
3. Server-led systems are where the webmaster needs to make modifications to their web page, and therefore are limited. Few students will visit websites of this type.

There are many cut-and-paste forms which also double as word processors/text editors. The most popular and widely endorsed is Balabolka.

The most popular commercial versions are ClaroRead and TextHelp, which come in various forms.

Form	Type	Examples
<b>Browser</b>	Locally installed, local voice	ATBar
	Locally installed, server voice	SpeakIT, BabelBar, Select and Speak
	Server-led	Recite Me, Browsealoud
<b>Software based</b>	PDF	Read Out Loud
	MS Word	WordTalk, Speak
<b>Standalone</b>	Cut and paste/import	Balabolka, Natural Reader

Base	Type	Examples
<b>Toolbar</b>	Locally installed, local voice	ClaroRead, TextHelp
	USB-based	ClaroRead, TextHelp



## **Apps for iPads, iPhones and Androids**

Everyday there are notifications of new and improved TTS apps for smartphones and tablets, be they for Apple, Android or Windows. There are a number of places that are worth visiting, two of which are shown here.

The most popular for the iPad are:

- iSpeech
- Speak It
- Speech Magnet
- Web Reader HD
- Dragon Dictation
- Voice Dream Reader

From: [www.educatorstechnology.com/2013/11/5-excellent-text-to-speech-ipad-apps.html](http://www.educatorstechnology.com/2013/11/5-excellent-text-to-speech-ipad-apps.html), Access date 1 February 2015

For Android phones, the most popular are:

- Ivona Text-to-Speech HQ
- Easy Text to Speech
- Talk – Text to Voice
- CereProc
- Acapela TTS Voices

From: [www.geekersmagazine.com/20130617/text-to-speech-android-apps/](http://www.geekersmagazine.com/20130617/text-to-speech-android-apps/)  
Access date: 1 February 2015

However, check the latest reviews before making your final choice.

## Choosing the right voice

Text-to-speech software can come with a variety of voices. Microsoft developed a series of voices that are freely available and are exploited by freeware, whilst Apple now has Siri.

There is little research that would suggest if the same TTS voice should be used for bedtime stories as for high-stakes learning such as making exams accessible. However, given the research in the fields of broadcasting and advertising, it would seem unlikely that the same voice would be optimum for both contexts. We implicitly add attributes to a voice, and therefore the chosen voice may significantly impact on how much of the text is absorbed.

Fortunately, there are now a large number of sites whereby you can try the different voices beforehand. However, they only offer short sound bites and may not be what you would prefer to spend an hour listening too. The final choice should, of course, be with the learner. What adults consider as important, such as naturalness, pleasantness and natural rhythm, may not be as important for the learner. Greater pausing between words and less intonation may make the comprehension easier.

Clearly TTS has moved forward considerably in the past 10 years, from a monotone that could be used with few programs, to sophisticated human-like voices and usable in many contexts. Interestingly, in the future we shall be able to have the voice of the teacher, derived from less than 30 minutes of reading. Whether that would be the preferred or most effective voice is another question.

When it comes to accents, there are now many to choose from. Thus for example, a learner in Cardiff could not only choose a male or female voice, but also a Welsh accent. A Welsh language voice is also available, offered free to all school children through RNIB.

## **TTS Control and SpLD**

Most manufacturers offer various controls, which can be useful additions to the TTS. The most important ones are listed below.

### **Speed**

The reading speed needs to be set by the individual, and their needs may be dependent upon their SpLD. For example, a dyslexic individual may prefer a slightly slower speed in order to comprehend everything, whilst an ADHD individual may prefer faster delivery.

### **Pauses**

Control of delivery, and stopping the software to allow the brain to catch up, or even to replay sections, is an important function, but does not form part of all training.

### **Tracking**

Some TTS provides coloured highlighting that follows at the word, sentence or paragraph level. Whilst following at the sentence or paragraph level can be useful, tracking at the word level can be distracting, and even reduce comprehension as attention is diverted.

### **Saving as sound files**

Many learners benefit from listening to sound files at a convenient time to them, such as on the bus to or from school. This is an important function when choosing TTS software. However, decisions should be made in association with understanding how and where sound files will be used.

## TTS voice

It may be a useful exercise to try to identify the best voice for any individual. Outlined below is a list of voice developers and their respective websites where examples of voices may be found (N.B. The numbers in the table below refer to the maximum number of characters permitted).

Component	Profiler	Demo
<b>Acapela Group</b>	<a href="http://www.acapela-group.com/">www.acapela-group.com/</a>	Yes
<b>Ivona</b>	<a href="http://www.ivona.com/en/">www.ivona.com/en/</a>	Yes
<b>Nuance (Nextup)</b>	<a href="http://www.nextup.com/nuance.html">www.nextup.com/nuance.html</a>	Yes
<b>Nuance</b>	<a href="http://www.nuance.com/for-business/by-solution/customer-service-solutions/solutions-services/inbound-solutions/loquendo-small-business-bundle/interactive-tts-demo/index.htm">www.nuance.com/for-business/by-solution/customer-service-solutions/solutions-services/inbound-solutions/loquendo-small-business-bundle/interactive-tts-demo/index.htm</a>	Yes
<b>iSpeech</b>	<a href="http://www.ispeech.org/text.to.speech">www.ispeech.org/text.to.speech</a>	Yes (Max 170)
<b>Read Speaker</b>	<a href="http://www.readspeaker.com/languages-voices/">www.readspeaker.com/languages-voices/</a>	Yes (Max 250)
<b>Cepstral</b>	<a href="http://www.cepstral.com/en/demos">www.cepstral.com/en/demos</a>	Yes (Max 120)
<b>Cereproc</b>	<a href="http://www.cereproc.com">www.cereproc.com</a>	Yes (Max 150)
<b>Google</b>	<a href="http://www.translate.google.co.uk">www.translate.google.co.uk</a>	Yes (More than one page)
<b>Natural Reader</b>	<a href="http://www.naturalreaders.com/onlinetts.php">www.naturalreaders.com/onlinetts.php</a>	Yes (More than one page)

## Testing your TTS

Not all TTS systems respond in the same way. You may like to use the following as a test of your system. It does not mean you will change your mind, but you will at least know what problems to expect.

Copy and paste this text below to test your TTS software.

### When text to speech breaks down

When you read that title, ask yourself how you knew it was a heading. There are several ways, but the simplest is to say there is a capital letter for a word that is not a proper noun and is on a new line. So why can't TTS programmers write a simple algorithm like that? Good question!

Then there is the question of bullet points. Consider the following.

- A bullet point is a stand-alone statement.
- Bullet points deliver information concisely.
- They often do not have full stops at the end.
- They do not always start with capitals.
- They always have bullets, though these may be circle, squares, numbers or letters.

Again, a very simple algorithm could be developed to provide consistent reading that takes care of bullets.

Then there are dates. The outcome can depend on the nature of both the voice and the engine. But consider how 25/12/14, 25/12/2014, 25th December 2014 and 25 December 2014 (as well as other variations including the American convention of 12/25/2014) are each read.

Finally we have heteronyms, words that are written the same way but are pronounced differently in different contexts. Here are a few more famous examples.

- The cow was too close to close the gate.
- The wind blew too hard to wind the sail.
- Just for a minute, it looked minute.
- A new bandage was wound around the wound.
- His insurance was invalid because he was an invalid.
- He could not bow as he held his bow. So he put down his bow and arrow. Then he could bow to the king.
- As she thought she saw the tear in her dress, she shed a tear. Then she saw she did not tear her dress, so she shed another tear.

How did your TTS system handle this?

## Concept mapping

Concept mapping, sometimes referred to as mind mapping, spider diagrams, brainstorming diagrams or visual thinking diagrams, was originally conceived in the 1970s by Joseph Novak as a means of showing the relationship between science concepts. It is used increasingly in both business and education as a way to move from a bunch of ideas to a structured plan, whether it is for a project or an essay.

Many individuals with SpLD have significant problems in the area of free writing, since they lack the basic skills to put their ideas down on paper. Concept mapping bridges that gap between the ideas in their brains and the final written form. There are many videos on YouTube that illustrate how to make a concept map, though the following is a good introduction:

<https://www.youtube.com/watch?v=wLWV0XN7K1g>

However, this does not include Popplet, a current favourite for many in education.

The author, Roy Grubb, also has a website that maintains up-to-date information that will help in deciding what to choose, including a list of mobile versions. It can be found at:

[http://www.informationtamers.com/WikIT/index.php?title=Main\\_Page](http://www.informationtamers.com/WikIT/index.php?title=Main_Page)

Wikipedia also is a good reference source for many of the more popular versions:

[http://en.wikipedia.org/wiki/List\\_of\\_concept-\\_and\\_mind-mapping\\_software](http://en.wikipedia.org/wiki/List_of_concept-_and_mind-mapping_software)

## **(Continued)**

There are many uses of concept mapping, which may determine the software used. Listed below are the main uses.

### **Brainstorming**

Sometimes you just need to get the idea from the brain to 'paper', or better still, the computer screen. The starting point is the words (or nodes), followed by links and a hierarchical structure. Unfortunately most software does not allow you to have 'free boxes' as they want to create links from the beginning. It is strongly recommended that the principles of brainstorming and concept mapping are understood through making paper versions before trying to do it on the computer.

### **Memorising for learning and exams**

By creating a visualisation of the links between topics, it helps reinforce the learning. Furthermore, when revising those examination notes, it is quicker and easier to look at a simple visual structure than to read a lot of text.

### **Developing and planning essays and reports**

Concept mapping is a useful tool in the development of essays and reports, offering structure at the required level of detail, from chapter down to paragraph level.

### **Project planning**

Project management is one of the biggest commercial uses of concept mapping, allowing visual representation that clearly shows the links and critical paths in the development process.

### **Explaining to others**

It can take a long time to write out text to clearly explain a subject. A concept map can allow many ideas and their relationships to be simply shown. They allow jumping between the ideas in a way that is often suited to the dyslexic individual, while still providing a basic structure (and memory aid so one does not forget anything).

### **Class notes**

Many students like to develop concept maps instead of writing long class notes. These are often quicker ways to take notes and show relationships, requiring fewer words than an essay style approach. They are also very good for revision. However, learners still need to practice the skill. This is usually carried out on paper, though there is no reason why a tablet could not be used.

## (Continued)

The introduction of the first tablet, the iPad, (and its forerunner, the iPhone) created a quantum shift in graphics. The latest versions of software have a look and feel that is very different from 10 years ago. Learners not only become used to the more up-to-date look and feel, they often resent something that seems 'old fashioned'. Some of the more popular versions have a look and feel that seems out of place in today's iPad offerings. For this reason, consider not only the functionality but also the look of the software, in terms of intuitiveness and the graphic interface.

The table below highlights some of the differences in software that would impact upon those with SpLD. Functions that some consider as assets, such as extensive options through menus, or the image libraries, are frequently a major distractor for those with SpLD, as they end up spending more time on making choices rather than making the concept map.

It may be argued that it is important to have the illustrations since they are integral to the memory and revision part of using concept maps. However, some (e.g. Popplet) allow free drawing. Also, there is no reason why the concept map could not be printed out, and then the illustrations added by hand. This would almost certainly reinforce better than if the illustration were chosen from within the software.

Category	Impact (SpLD perspective)
Type (online/offline)	Online and shared means the homework and essays cannot be lost or forgotten.
Picture library	A large picture library can be distracting.
Output to MS Word	This saves retyping, but the learner needs to understand how to order the items.
Menu items	Too many items can be very distracting, such that the learner can spend more time reviewing the menu than working on the concept map.



## (Continued)

It would be impossible to list even the major developers in this field. However, here are a select few that offer a range of diverse approaches.

PowerPoint – This can be used as a simple freehand tool to create text with links. Its wide availability makes it a good starting point for brainstorming, with the option to add links later. You can find free template at this web link:

<http://www.free-power-point-templates.com/articles/concept-map-templates-for-powerpoint/>

Bubbl Us – This was one of the early fully online versions which allowed for collaboration between learners, or sharing between the learner and the teacher.

[www.bubbl.us/](http://www.bubbl.us/)

Popplet – This may be considered SpLD-friendly, since it is free from distractors and is intuitive. Being online, it allows sharing, and will not be forgotten.

Prezi – Although at first this looks good with its apparent unstructured approach, the concern is that for many learners with SpLD it will be distracting as it can do too much. It is worth investigating as an alternative perspective, but careful consideration should be given to its use. [www.prezi.com](http://www.prezi.com)

Inspiration – This is one of the most widely known. However, some suggest that the graphics of the main version have not kept pace with those of tablets and social media. If this is not a problem, it could be considered. [www.inspiration.com](http://www.inspiration.com)

Other popular versions include:

- [www.mindmeister.com/education](http://www.mindmeister.com/education)
- [www.spiderscribe.net/](http://www.spiderscribe.net/)
- [www.mind42.com/](http://www.mind42.com/)

Free standalone versions:

- Xmind – [www.xmind.net](http://www.xmind.net)
- Freemind – <http://freemind.sourceforge.net/>
- Blumind – [www.blumind.org/](http://www.blumind.org/)

For an extensive (though not complete) list, try this:

[http://en.wikipedia.org/wiki/List\\_of\\_concept\\_and\\_mind\\_mapping\\_software](http://en.wikipedia.org/wiki/List_of_concept_and_mind_mapping_software)

For lists of app versions, try the following sites:

- <http://appsineducation.blogspot.com/>
- <http://www.educatorstechnology.com/2014/10/10-great-ipad-apps-for-creating-concept.html>

Note that creating concept maps on tablets can be very rewarding, since the environment is designed for exactly this type of activity. However, using a smartphone can be problematic since the screen size does not allow the ideas to expand. Whilst they can go 'off screen', the learner usually needs to see the whole picture at once, rather than try to use visual memory to recall what becomes hidden.

## Speech-to-text

### Speech-to-text software

The speech-to-text (SST) landscape is evolving rapidly, such that whatever the current state of play, even in a year's time, the landscape may be very different. We have already seen the impact that systems such as Apple's Siri (speech-to-text on iPhones, introduced in late 2011) have had, as well as those used on Android smartphones. Whilst their potential has, arguably, been realised by those outside of special needs, for the world of SpLD, this landscape still needs to be explored.

However, most of the new work uses generic recognition, which does not include training by the user. This will limit progress in the short term, and may make it frustrating for many users.

### How speech-to-text helps those with SpLD

Traditionally, speech-to-text has been about the user speaking words and the computer turning those words into text on the screen, with maybe 95 per cent accuracy. Those who have difficulty in writing, for whatever reason, have embraced it, but arguably only to a limited extent. The problems are several-fold.

- It is not 'out of the box and start using' as is most of the technology.
- To start, you need to train it to your voice, which can mean a significant amount of fluent and accurate reading, which is often the main problem of the user.
- When an error is made, the alternatives offered are still very difficult for those with SpLD.
- Insufficient training is available to ensure effective usage.
- The system has standard accents, but they are insufficient to cater for the need of many SpLD individuals.

The most obvious way that STT is used by SpLD learners is for the purpose of writing at length. However, there are many other uses, such as:

- using voice commands to move between software types
- performing searches on the internet
- writing text for social media
- writing e-mails
- making notes
- writing shopping lists
- writing to-do lists.

There are also a number of creative uses for speech-to-text, adopted by speech therapists helping those with speech and language impairment, both for learning, and as assistive technology.

The plethora of apps that include STT would suggest that the problems have been solved. However, with few exceptions, the software is not suitable for writing at length, nor where it is used for high stakes testing, such as coursework. That does not mean it cannot be used creatively, in small chunks, with a lot of checking. However, for

significant amounts of text with minimal editing, the software needs to be trained to the voice of the individual.

## **(Continued)**

### **Available versions**

**Dragon Naturally Speaking** is software usually in the form of a download or CD that then adapts to self-improve over time. There is also a low-cost smartphone version, Dragon Dictation. However, for that version, the speech is sent to a central server for processing with text sent back to the phone. The ability for the smartphone version to self-learn and improve by closer matching to the user is limited.

The best source of further information for this software is the Nuance Dragon channel on YouTube. They provide good tutorials on how to get the best from the software.

Another option is SpeakQ from goQ Software, which is a speech-to-text program that can be used with different software such as MS Word. It comes integrated with wordQ, which includes text-to-speech and a powerful word predictor.

[www.goqsoftware.com/wordQspeakQ.php](http://www.goqsoftware.com/wordQspeakQ.php)

### **Other options**

There are other options, including those built into the operating system, such as MS Windows and Apple iPads. All are of very good quality, but with limitations since they are not designed for long flowing text, nor to learn your voice.

There are many YouTube videos that demonstrate the quality and potential of such software. Please note that these have advanced considerably in recent years, and therefore you need to ensure that the video relates to the software on your computer. Here is one that is particular good at showing different systems.

### **PC Speech Recognition Software by Explaining Computers**

<https://www.youtube.com/watch?v=8KqwiGvsOs>

This includes a demonstration of the built-in MS Windows voice recognition and how it can be used for dictation.

In addition, the following are worth reviewing, at least for showing the potential to learners.

### **Google application programming interface (API)**

Many online applications are appearing that use the Google API, which will probably be the source of many advances in the coming years. The Google API demonstration may be found at:

<http://www.google.com/intl/en/chrome/demos/speech.html>

### **Dictation input/output (OI)**

This is a free online service that uses the Google API. There are also smartphone versions. However, they seem less reliable than browser-based ones. It can be used in different languages (e.g. Polish), but Welsh is not available. It may be found at:

[www.dictation.io](http://www.dictation.io).

## **Talktyper**

This is also a Google API cloud-based solution, allowing short sound bites to be transcribed.

<https://talktyper.com/>

Indicative of the proliferation of speech-to-text apps, there are websites such as the Best 100 free apps for speech recognition. Again, this requires a needs analysis to identify what is required, and what best serves the purpose.

<http://appcrawlr.com/ios-apps/best-free-apps-speech-recognition>

As with all software, it is strongly recommended that you read the reviews.

## Memory and time management

This section deals with assistive technology that is designed to support the areas of learning that may be considered as support functions to the actual learning. There are many terms that could be used here, with the overlap of terminology making it difficult to define what it is, especially since the software can be used in multiple ways. The terms that may be covered in this section include:

- memory and recall
- organisation
- planning
- time management.

As such, the software may be said to assist in the retention and recall of specific information that may be time dependent, as well as planning and organising information in a structured way. However, it is not about recall of academic content-specific material, an issue that is not specific to SpLDs.

Note that increasingly the term 'executive function' is being used in the assessment process, particularly in the field of SpLD, referring to the (dis)ability in working memory, reasoning, planning and execution of those plans. This overlap suggests that this software could also be considered as important for supporting those with executive dysfunction.

Although the range of the use of this software is large, below are a series of examples, which in turn assist in identification of appropriate assistive technology:

- short-term memory (e.g. shopping lists)
- long-term memory (e.g. to-do lists)
- time dependent (e.g. birthdays)
- high stakes (e.g. passwords)
- composite (e.g. coursework deadlines and exam timetables).

All this is integral to the concept of planning and organisation. You need to plan and be organised to be able to set the memory joggers and alarms, and you need those reminders to maintain the planning and organisation.

As can be seen, some have simple memory functions, whereas others have single or multiple time components.

On the following pages are suggestions for each.

## (Continued)

To be effective, a reminder needs to be close to the time that you need the information. This is especially true for those with memory problems, a common occurrence for those with SpLD. For example, if you need to remember that history homework has to be taken in on Wednesday, there is no point only setting a reminder on Tuesday night to put it in the bag. It also has to be for Wednesday morning, just before leaving home. This is over and above a reminder for doing it in the first place. It is the needs analysis that will reveal the needs of any assistive technology memory aids, and where they may be. Again, there is little point in having it on the computer for a reminder alarm to go off just before leaving the house. In this case it should probably be on the smartphone.

However, there is also the issue of remembering to set the reminder, and when an alarm goes off, to know exactly what it means. If the alarm says 'History' and one takes the books but forgets the homework, that is not very effective. Without wanting to remove responsibility from the learner, sometimes it can be good to have somebody else involved in the process, be it a practitioner or a parent/carer. For example, teachers are increasingly using technology such as SMS to remind students of homework. With calendars being more and more online, it becomes simple to ensure a parent/carer can track that schedules from homework to games kits and extra curricula activities are not forgotten.

The biggest problem with this category (as with many categories in assistive technology) is that the market tends to take what should be a simple product and then keeps adding to it until the original advantage of simplicity is lost. Unfortunately, this section is also one of the easiest for programmers to try their skills, since the concepts are relatively simple. Furthermore, many of the simpler concepts have become complex due to the apparent needs of businesses, which are not so important as the school level. Thus whilst reviewers may endorse tools such as Omnifocus (for Macs) or Wunderlist, these do not serve the needs of those with SpLD. Usually what is required is a simple tool, which allows items to be entered, possibly categorised, and alarms set, usually with repeats.

The following are examples that are not designed for adults, but may be great for learners by combining gaming and rewards as part of the process:

- Epic win – [www.rexbox.co.uk/epicwin/](http://www.rexbox.co.uk/epicwin/)
- iReward Chart – <http://www.irewardchart.com/>

## (Continued)

Here are some of the other examples that may work for learners of different ages and abilities.

**Memo to Me** – A slightly dated interface, but simple and easy to use.

[www.memotome.com](http://www.memotome.com)

**Remember the milk** – Has a good reputation and plenty of YouTube videos.

[www.rememberthemilk.com](http://www.rememberthemilk.com)

**Remindeo** – This is a well-established cross-platform system, and now has voice call reminders.

[www.remindeo.com](http://www.remindeo.com)

**HassleMe** – As the name suggests, is about a simple service that repeatedly sends e-mail reminders to do something, like play the piano, or tidy your room.

[www.hassleme.co.uk](http://www.hassleme.co.uk)

**Countdown timer** – A very simple onscreen timer, which reminds you to ‘Stop now!’. Very useful if you want to remember to stop doing a task, such as reading a web page.

[www.timerrr.com](http://www.timerrr.com)

**Online stopwatch** – This is a more sophisticated online timer, which will simply tell you how long you have been on a task, or tell you when time is up. One option is a talking clock.

[www.online-stopwatch.com](http://www.online-stopwatch.com)

**Remind** – This is designed specifically for schools and is centred around an SMS reminder system.

[www.remind.com](http://www.remind.com)

Note that there are many calendar and email systems that have an option to send e-mails (and sometimes SMS). Explore the internet for the best options.

### **Simplicity**

Often the simplest option is best. For example, one of the classic reminder systems for MS Windows computers is Zhorn Stickies. The ‘always on the desktop’, simple to use, with colour and alarm functions means it sticks to the task in hand. However, nowadays we often demand more, and this does not go with the learner, cannot be accessed on other computers, nor from a smartphone. But the principle remains that the needs analysis should determine what is best in a given situation.

## **Auditory memory**

Another form of memory management important for those with SpLD is recording. This can be carried out using a smartphone. However, it is how the recording is used that is important. Audio capture software can be useful for recording lessons, and if used with annotation software, can provide a valuable recording, memory and revision tool.

Although usually aimed more at students in further and higher education, the learner in secondary school may also find these helpful. However, their effectiveness will depend on the training and support, particularly from parents/carers. Here are three examples:

- CaptureAudio – [www.captureapps.com](http://www.captureapps.com)
- Recordium – [www.recordiumapp.com](http://www.recordiumapp.com)
- Sonocent Recorder – [www.sonocent.com](http://www.sonocent.com)



## Attention and concentration

A search of the internet will suggest there are many tools that claim to help with attention, concentration and 'brain training'. Some even claim to be endorsed by 'cognitive scientists'. However, most are nothing more than mini-quizzes, with little research evidence that whatever skills may be acquired during these activities will have any benefits outside of that specific activity. These are not assistive technology. At best they can be called 'learning software'.

However, there are some tools that may be classified as assistive technology in the area of attention and concentration. As with other areas, the start of the process of identifying what helps begins with the needs analysis. This means identifying what may cause or contribute to the loss of attention. Whilst the technology can do little about extraneous noises or what goes on elsewhere in the classroom, there are certain circumstances where the technology can help. Below is an attempt at classifying the types or areas where assistive technology can help. Note that the range of possibilities is given, some of which may be applicable at educational settings and some of which may only be possible at home. Most of these have a free version, whilst some have a paid for version with more functionality.

### On-screen distraction

Often you need to have multiple screens open in order to do a project. However, there is software which in effect puts a dark cloth over the entire screen except the active window. An example is:

- DropCloth – <http://www.softpedia.com/get/Desktop-Enhancements/Other-Desktop-Enhancements/Dropcloth.shtml> (MS Windows)

### Site blockers

If the person has the potential to go off to another site, such as social media, these can be blocked. Examples include:

- Anti-social (Windows and Mac) [www.anti-social.cc](http://www.anti-social.cc)
- StayFocusd (browser based) Google Chrome
- LeechBlock (browser based) Firefox add-on

### Action limiters

Sometimes it is better to restrict time spent away from what should be the focus rather than block it completely. There is software that will assist in maintaining focus by controlling limited access to known distractors. Examples include:

- Selfcontrol (Mac) <http://visitsteve.com/made/selfcontrol/>
- Concentrate (Mac) <http://www.getconcentrating.com/>
- Focus Booster (MS Windows and Mac) [www.focusboosterapp.com](http://www.focusboosterapp.com)

### Break schedules

Everybody needs a break, and there are different forms of breaks, from a 10 second stretch every 10 minutes, to a five-minute break every 30 minutes. Some of these work in collaboration with the site blockers.

- Time Out (Mac) <http://www.dejal.com/timeout/>

### **Action trackers**

These follow the actions and times of the users as they move between activities such as using MS Word or the internet. It can also track the web pages. Thus a report can be generated to know how the computer has been used in a given time, whether that is an hour or a year.

- Rescue Time (MS Windows) [www.rescuetime.com](http://www.rescuetime.com)

There are also those that provide results relative to a specific task, such as writing so many words in a given time. One of the best is:

- WriteOrDie (Online) [www.writeordie.com](http://www.writeordie.com)

Other types include goal-setting software, services and apps. There are many examples on the web, changing every day. However, you may like to try this site below, or those listed in the appendix.

<http://appadvice.com/appguides/show/habit-building-apps>

Clearly each of these has their uses. What is important is how it is used. Review, negotiation and rewards are often the key to acceptance of attention and concentration software that may appear to the learner as oppressive and intrusive. And for many, their first task will be to find a way to turn it off.

## Proofreading tools

### Types of spelling and grammar checkers

The traditional, main assistive technologies for proofreading are spelling and grammar checkers, though they are not the only ones. Although these are frequently integral to software (e.g. MS Word), they are not always as reliable as they claim. Furthermore, if you make an error, then the software must make suggestions as to what may have been intended, which requires being able to distinguish between what is often a subtle difference in words. The ease of making a decision which is correct may depend upon the learner's SpLD. Thus, somebody with dyslexia may prefer a different form of spellchecker to a learner with SLI. A thorough needs analysis will identify what should be used for a given individual.

#### Microsoft Office-based

MS Office comes with its own built-in spelling and grammar checker. However, whilst most learners will know how to use the spellcheckers, not everybody is familiar with how to use the grammar part. Clear instructions and familiarity are necessary to get the most from this free option.

#### Standalone spellchecks

These can be very useful, especially when you do not have access to a computer, and support with handwriting is required. You may also consider a talking version, and the inclusion of a dictionary/thesaurus. However, remember that, in principle, the more expensive it is, the more words it will contain, and probably it will be more difficult to find the right word. Therefore, it is often best to go for a cheaper version. The talking version may be good for home, but versions that allow headphones to be used (e.g. the Franklin Children's Talking Dictionary and Spell Corrector) should be used in class.

#### Online – free and commercial

The lines have become blurred over free and commercial versions, since often the commercial versions can be free, up to a certain level of usage. However, many of these only question what has been written, and make one or two suggestions as to what could possibly be used. This is not good if your problem is making that choice in the first place. Although no particular software is recommended, the following may be considered on a free or 'try before you buy' basis.

- [www.ghotit.com](http://www.ghotit.com)
- [www.gingersoftware.com](http://www.gingersoftware.com)
- [www.grammarchecker.net](http://www.grammarchecker.net)
- [www.grammarly.com](http://www.grammarly.com)
- [www.onlinecorrection.com](http://www.onlinecorrection.com)
- [www.paperrater.com](http://www.paperrater.com)
- [www.reverso.net](http://www.reverso.net)
- [www.spellcheckplus.com](http://www.spellcheckplus.com)

#### Browser-based options

Most browsers have extensions for spelling and grammar checks, as well as dictionaries. These come in different formats. Read the reviews before installing them. Some browsers (e.g. Chrome) have built-in spellchecking capabilities, however, you may need to turn it on to activate the functions.

## **Text-to-speech**

Text-to-speech is one of the most useful forms of proofreading, since many learners with SpLD have different forms of difficulty, but all are supported by TTS. Reading difficulties and attention/concentration are significant problems. These are largely relieved when you can listen to the text. Most learners with SpLD do not suffer from significant listening comprehension problems. Therefore they will be able to identify when something 'does not sound right'. The trick is to then teach them how to stop the software, make the change, and then check the change is what they wanted.

## **Auto-correction**

The built in auto-correction of MS Word is useful in its default status, but can be greatly improved if there are regular errors made. For example, it will change 'thier' to 'their' automatically as it knows there is no possible use of the incorrect version. This is not easy if you have reading and writing difficulties. You can also add to the auto-correction, allowing it to correct your most common errors, which may not already be in the system. It can also be used to turn simple abbreviations into words, sentence or phrases. For example on a home computer, a learner may want to use auto-correct to write their name when they type their initials. However, this may be impractical at school.

There are commercial versions available, such as the Cardiff-based Lexable, which learns from your errors and corrections, allowing the user to concentrate on content rather than errors.

## **Word prediction**

Although this would appear to be a benefit for many individuals, and is incorporated into various types of software aimed at supporting those with writing difficulties, the potential is questionable and should be reviewed on an individual basis.

A particular problem, for example, is that if you start to type the word, and it is misspelt, then the suggestions will not be helpful. Even if you get it correct, the options may be overwhelming, particularly if not supported with text-to-speech and a thesaurus.

However, one commercial package, wordQ, has been found to be useful for many reluctant writers.

<http://www.gogsoftware.com/wordQ.php>

## **Summarisers**

10,000 words is a lot for anyone to read, even if you have text-to-speech. (For a learner who is a good reader, reading at 160 words a minute, that would take about an hour without breaks.) If you add SpLD, whether that is a reading difficulty or an attention and concentration problem, that can be a very long time.

The summariser, built into MS Word, was removed from the 2010 and subsequent versions. However, a number of online summarisers have appeared which are more able to reflect recent advances in the algorithms that drive them. However, results are variable and test should be made before opting for one version. Examples include:

- [www.sumplify.com](http://www.sumplify.com)
- [www.tools4noobs.com/summarize](http://www.tools4noobs.com/summarize)
- [www.freesummarizer.com](http://www.freesummarizer.com)
- [www.textcompactor.com](http://www.textcompactor.com)

## Preferences

### User preferences

Everybody is different, and when it comes to working with the computer we each have our own preferences. To some people, those changes make little difference – their tolerance to less than optimum settings is considerable. However, for many with SpLD, even small changes can make a difference. Although there is little quality research that clearly shows preferences for a given group, it is clear that at an individual level, making adjustments in line with what they think works for them can clearly make a big difference.

Most of these differences may be termed ‘visual’, and have been discussed in terms of reducing ‘visual stress’. However, sometimes we just prefer something different, as it makes it easier, without necessarily calling it stress.

When working at the computer, most of the work will be in the form of reading or writing a document in MS Word, reading a PDF document, or accessing the web via a browser. In addition, there will be circumstances when specific software needs to be used, such as subject-specific software. The latter will be software specific, but should have built-in accessibility controls.

### Background colour

There has been much discussion about how paper is getting brighter and whiter, and the negative impact that has on the reader, particularly on those who are dyslexic. What has been less researched is the impact of computer screens becoming brighter. People tend to accept the computer default settings (or those of the previous user) rather than to try and adjust to their own needs. Simply cutting the brightness can make the screen more readable. More frequently, the user changes the background colour, generally to a pastel colour such as cream or pale blue. This has a similar effect, and should be informed by personal preferences.

### Changing background colours in MS Word

There are many colour options to choose from through the ‘Themes’ colour palette which can be accessed through:

- Page layout > Page Colour

However, the precise details to change the setting will depend upon your version of MS Office. YouTube has some useful videos on how to do this.

### Changing background colours in Adobe Acrobat

The colour palette in Adobe Acrobat allows you to choose an appropriate colour. This can be accessed through:

- Edit > Preferences > Accessibility > Custom Colour > Background

### Changing background colours on websites

Many websites now have accessibility options, with alternative themes, based on the most popular combinations.

There are ways to change the browser, but these depend on which browser you are using, and the software version. Some have built-in options, whilst others use extensions. However, if you are installing an extension, check carefully the comments, or stop working when new versions of browsers are released.

## **User preferences – text preferences**

### **Text style preferences and layouts**

There are several adjustments that can be made to text which may offer easier reading. The most obvious and common is text size, and the typeface used. The options to consider are:

- typeface
- font size
- font colour
- line width
- letter spacing.

### **Typeface**

There is much debate as to what should be the default typeface for reluctant readers. Many advocate Comic Sans, which anecdotally does appear to be a preference. The 'serif' typefaces (where the letters have 'feet') such as Times New Roman often lose their clarity on the screen unless it is high resolution. Hence many people advocate 'sans serif' typefaces. It is recommended that the typeface is reverted to something traditional when handing work to somebody else in a paper format, since most people prefer what they are used to.

### **Font size**

On paper, most would suggest a font size of 12 to 14 point. However, this is irrelevant for reading from the screen, since the size it appears is dependent upon screen resolution and degree of zoom. Therefore, 'what is comfortable' is best.

### **Font colour**

Although this is an option, it is rarely used. However, it may be useful if certain background colours are used, e.g. dark or intense colours, or for certain types of colour blindness.

### **Line width**

The space between lines can be surprisingly important, and finding the optimum can make a significant difference to reading speed and comprehension. If the lines are too close, the text can merge together, whereas if they are too far apart, it may be difficult to track from one line to the next.

### **Letter spacing**

The space between letters can be adjusted to help readability. However, care must be taken to ensure that it is still clear where the space between the words occurs.

Note that all of these can be adjusted in MS Word, but it is more problematic in PDFs and on the internet. However, if it is critical, the text could be copied and pasted into an MS Word document, and then adjusted according to personal preferences. Although this takes additional time and effort, if the impact is significant, then it should be considered.

**Sound preference**

Some systems have built-in capability to, for example, read out menus and screen tips, such as the Narrator system in MS Windows. This may be very useful for some individuals.



## **Annex A: Using assistive technology for reading and writing support**

The processes of learning to read and write cannot be taken in isolation, as there are many aspects to each, including context. On these pages, the focus is around reading (accepting other people's information) and writing (providing others with one's thoughts), and how information technology can be used to harness and store that information.

As discussed earlier in this document, there are several ways to look at the relationship between the learning process and assistive technology. In this view, the primary processes of reading and writing are broken down into their component parts, and the links suggests the assistive technology that can support each part.

Note that the processes and suggestions should not be seen as definitive, but as a good starting point to which you may wish to make further additions. However, any suggestions should not be viewed as recommendations or endorsements of those products and services.

## Reading, listening and note-taking

Listed below is the suggested software that may help in the area of reading, listening and note-taking. This is not definitive, but a guide to some of those assistive technologies that may be involved, depending on the context. For example, it may be important to remember text you read in a school book, but it may not be so important to remember content of an online newspaper.

Reading, listening and note-taking	Example of assistive technology	Links
Reading – with free text-to-speech	ATBar	<a href="http://www.atbar.org">www.atbar.org</a>
	BabelBar	<a href="http://babelbar.com/">http://babelbar.com/</a>
	Balabolka	<a href="http://www.cross-plus-a.com/balabolka.htm">www.cross-plus-a.com/balabolka.htm</a>
	Browsealoud	<a href="http://www.browsealoud.com/">www.browsealoud.com/</a>
	Natural Reader	<a href="http://www.naturalreaders.com/">www.naturalreaders.com/</a>
	Read Out Loud	Part of Adobe Acrobat Reader
	Recite Me	<a href="http://reciteme.com/">http://reciteme.com/</a>
	Select and Speak	See Google Chrome Store
	WordTalk	<a href="http://www.wordtalk.org.uk/">www.wordtalk.org.uk/</a>
Reading – with commercial text to speech	Claro	<a href="http://www.clarosoftware.com/">www.clarosoftware.com/</a>
	Texthelp	<a href="http://www.texthelp.com">www.texthelp.com</a>
Reading – with text-to-speech apps (See online stores)	iPad	iSpeech
	iPad	Speak It
	iPad	Speech Magnet
	iPad	Web Reader HD
	iPad	Dragon Dictation
	iPad	Voice Dream Reader
	Android	Ivona Text-to-Speech HQ
	Android	Easy Text to Speech
	Android	Talk – Text to Voice
	Android	CereProc
Android	Acapela TTS Voices	
Text summarizer	Sumplify	<a href="http://www.sumplify.com">www.sumplify.com</a>
	Tools4noobs	<a href="http://www.tools4noobs.com/summarize">www.tools4noobs.com/summarize</a>
	Free Summarizer	<a href="http://www.freesummarizer.com">www.freesummarizer.com</a>
	Text Compactor	<a href="http://www.textcompactor.com">www.textcompactor.com</a>
Listening	CaptureAudio	<a href="http://www.captureapps.com">www.captureapps.com</a>
	Recordium	<a href="http://www.recordiumapp.com">www.recordiumapp.com</a>
	Sonocent Recorder	<a href="http://www.sonocent.com">www.sonocent.com</a>
Note-taking	Concept mapping tools	See above
Time management	Time management	See list in the Writing support section

## Writing support

Listed below are some examples of the assistive technology that can support those areas involved in the writing process mapped into:

- planning and preparation
- text development
- proofreading
- on time and on task.

Details of their usage can be found elsewhere in this document. Note that these are examples and not recommendations and that this is not a definitive list but should be seen as examples of what is possible, in particular with free software.

Planning and preparation	Example of assistive technology	Links
Brainstorming	Zhorn Stickies	<a href="http://www.zhornsoftware.co.uk/stickies/">www.zhornsoftware.co.uk/stickies/</a>
	OS Stickies	See the operating system
Online research – Tracking pages visited	Zotero	<a href="http://www.zotero.org">www.zotero.org</a>
	Mendelay	<a href="http://www.mendeley.com">www.mendeley.com</a>
Reading	Text-to-speech	See Reading, listening and note-taking section
Concept mapping – Online	Popplet	<a href="http://www.pollet.com">www.pollet.com</a>
	Bubbl	<a href="http://www.bubbl.us/">www.bubbl.us/</a>
	Prezi	<a href="http://www.prezi.com">www.prezi.com</a>
	Inspiration	<a href="http://www.inspiration.com">www.inspiration.com</a>
	Mindmeister	<a href="http://www.mindmeister.com/education">www.mindmeister.com/education</a>
	Spiderscribe	<a href="http://www.spiderscribe.net/">www.spiderscribe.net/</a>
Concept mapping – Offline	Mind42	<a href="http://www.mind42.com/">www.mind42.com/</a>
	Xmind	<a href="http://www.xmind.net">www.xmind.net</a>
	Freemind	<a href="http://freemind.sourceforge.net/">http://freemind.sourceforge.net/</a>
	Blumind	<a href="http://blumind.org/">http://blumind.org/</a>
Concept mapping apps	MS PowerPoint	MS Office
	Apps site	<a href="http://appsineducation.blogspot.com/">http://appsineducation.blogspot.com/</a>
Linear structure	Apps site	<a href="http://www.educatorstechnology.com">www.educatorstechnology.com</a>
	MS Word	MS Office

Text development	Example of assistive technology	Links
Structure templates	Many examples	Search for writing templates or similar
Word prediction	WordQ	<a href="http://www.gogsoftware.com/wordQspeakQ.php">www.gogsoftware.com/wordQspeakQ.php</a>
Writing	MS Word	MS Office
Talking word processor	Write:Outloud	<a href="http://www.donjohnston.com/writeoutloud">www.donjohnston.com/writeoutloud</a>
	MS Word with Wordtalk	<a href="http://www.wordtalk.org.uk/">www.wordtalk.org.uk/</a>
Speech to text	Dragon Naturally Speaking	<a href="http://www.nuance.com/dragon/index.htm">www.nuance.com/dragon/index.htm</a>
	speakQ	<a href="http://www.gogsoftware.com/wordQspeakQ.php">www.gogsoftware.com/wordQspeakQ.php</a>
	Google API	<a href="http://www.google.com/intl/en/chrome/demos/speech.html">www.google.com/intl/en/chrome/demos/speech.html</a>
	Dictation IO	<a href="https://dictation.io/">https://dictation.io/</a>
	Talktyper	www.talktyper.com
Auto-correction	MS Word	MS Office
Quantity management	Write or Die	<a href="http://www.writeordie.com">www.writeordie.com</a>

Proofreading	Example of assistive technology	Links
Spelling and grammar	MS Word	Part of MS Office
	Ghotit	ghotit.com
	Ginger Software	gingersoftware.com
	Grammar Checkers	grammarchecker.net
	Grammarly	grammarly.com
	Online Correction	onlinecorrection.com
	Paper Rater	paperrater.com
	Reverso	reverso.net
	Spellchecker Plus	spellcheckplus.com
Reading	Text-to-speech	See Reading section

On time and on task	Example of assistive technology	Links
Deadlines and time management	Memotome	<a href="http://www.memotome.com">www.memotome.com</a>
	Remember the milk	<a href="http://www.rememberthemilk.com">www.rememberthemilk.com</a>
	Remindeo	<a href="http://www.remindeo.com">www.remindeo.com</a>
	HassleMe	<a href="http://www.hassleme.co.uk">www.hassleme.co.uk</a>
	Countdown timer	<a href="http://www.timerrr.com">www.timerrr.com</a>
	Online Stopwatch	<a href="http://www.online-stopwatch.com">www.online-stopwatch.com</a>
	Remind	<a href="http://www.remind.com">www.remind.com</a>
	Stickies	<a href="http://www.zhornsoftware.co.uk/stickies/">http://www.zhornsoftware.co.uk/stickies/</a>
Attention and concentration	DropCloth	<a href="http://www.softpedia.com/get/Desktop-Enhancements/Other-Desktop-Enhancements/Dropcloth.shtml">http://www.softpedia.com/get/Desktop-Enhancements/Other-Desktop-Enhancements/Dropcloth.shtml</a> (Windows)
	Isolate	<a href="http://www.isolate.com">www.isolate.com</a> (Mac)
Attention and concentration – Site blockers	Anti-social (Windows and Mac)	<a href="http://www.anti-social.cc">www.anti-social.cc</a>
	StayFocusd (browser based)	Google Chrome
	LeechBlock (browser based)	Firefox add-on
Attention and concentration – Action limiter	Selfcontrol (Mac)	<a href="http://visitsteve.com/made/selfcontrol/">http://visitsteve.com/made/selfcontrol/</a>
	Concentrate (Mac)	<a href="http://www.getconcentrating.com/">www.getconcentrating.com/</a>
	Focus Booster (Windows and Mac)	<a href="http://www.focusboosterapp.com">www.focusboosterapp.com</a>
Attention and concentration – Action trackers	Rescue Time (Windows)	<a href="http://www.rescuetime.com">www.rescuetime.com</a>
	Write Or Die (Online)	<a href="http://www.writeordie.com">www.writeordie.com</a>
	Apps	<a href="http://appadvice.com/appguides/show/habit-building-apps">appadvice.com/appguides/show/habit-building-apps</a>
Break schedule	Time Out (Mac)	<a href="http://www.dejal.com/timeout/">www.dejal.com/timeout/</a>

## **Annex B: Sources of information on assistive technology**

There are many resources on the internet that have information about assistive technology that would help those with specific learning difficulties. However, many are well intended, but outdated. That is, since written, the version reviewed may have been improved, or superseded by something better. Detailed below are four sites that are useful for the reasons discussed. If you are looking to purchase specific software, you can do so by using any search engine online.

### **British Assistive Technology Association**

Web address: [www.bataonline.org/](http://www.bataonline.org/)

As well as listing commercial members interested in assistive technology, it also has a search engine which, if you put in the word 'webinar' plus whatever you are looking for, it provides a comprehensive list.

### **BDATEch**

Web address: [www.bdatech.org](http://www.bdatech.org)

This website has many types of assistive technology. Although dedicated to dyslexia, as noted in the report, many of the programs will also provide support for those with SpLD.

### **Communication and Assistive Technology for People with Disabilities**

Web address: [www.callscotland.org.uk](http://www.callscotland.org.uk)

This has a number of useful resources, such as the Wheel of Apps. However, note that not all of it is up-to-date.

Wheel of apps (2013) - [http://www.callscotland.org.uk/Common-Assets/ckfinder/userfiles/files/Wheel\\_Of\\_Apps\\_V1\\_0.pdf](http://www.callscotland.org.uk/Common-Assets/ckfinder/userfiles/files/Wheel_Of_Apps_V1_0.pdf)

### **Do-IT Solutions Ltd Webinars**

Web address: [www.doitprofiler.com](http://www.doitprofiler.com)

This Cardiff-based company offers regular webinars for free and supports an archive of talks around assistive technology as well as other aspects related to support for those with SpLD.

### **Lexdis – Technology Strategies for Learning**

Web address: [www.lexdis.org.uk](http://www.lexdis.org.uk)

This is a site that links technologies and strategies, collected from students. Though aimed at the student, some of the ideas can be adapted for learners at school.

### **Additional sites for choosing software for laptops, tablets and smartphones**

In addition to the Apple iTunes and Google Play shops, the following are just a small selection of many of the sites that have relevant information on the internet, with more coming online each month. Since these sites have a combination of software for computers, tablets and smartphones, and cover more than one category, they are listed together.

[www.appcrawl.com](http://www.appcrawl.com)

[www.appadvice.com](http://www.appadvice.com)

[www.androidcentral.com](http://www.androidcentral.com)

[www.capterra.com](http://www.capterra.com)

[www.otswithapps.com](http://www.otswithapps.com)

[www.apps4stages.wikispaces.com](http://www.apps4stages.wikispaces.com)

[www.educatorstechnology.com](http://www.educatorstechnology.com)

[www.iteach-uk.com](http://www.iteach-uk.com)