

SECTION 10 ACCESSIBILITY AND COMPATIBILITY OF FORMATS

Objective 10: To compare accessibility and compatibility of Accessible Formats

Outcome: Understanding of the accessibility of different alternative formats for different groups of pupils with additional support needs.

Summary

- 1) No single printed, audio or digital computer format is accessible for all pupils with additional support needs.
- 2) Required Printed formats include: resources printed in various font sizes and styles; on coloured paper; in Braille; Moon; and with symbol support.
- 3) Required Audio formats include: cassette, CD, MP3 and Daisy audio.
- 4) Required Digital computer formats include: Plain Text ('accessible', but not very usable); 'tagged' PDF documents (applicable, accessible and usable by many pupils with additional support needs but 'untagged' PDFs may not be usable by blind pupils with screen readers, for example); Daisy text books (more accessible for visually impaired pupils); electronic book formats like Daisy or MS Reader (not interactive and so not suitable for accessible worksheets, tests or examinations).
- 5) Accessibility, usability, applicability and availability are not synonymous. A resource may be technically 'accessible' but not usable by a particular pupil. Accessible materials are of no benefit unless they and the means to access them are also made available.
- 6) The use of a particular digital computer format does not necessarily result in a document that is accessible.
- 7) By educating publishers, authors and educators to use 'Incidental Obligatory Accessibility' (IOA)⁴¹ or 'Accessibility Without Trying' (AWOT), source learning materials will be more accessible and will be easier to convert to specific accessible formats.
- 8) Tools and processes exist to create and convert resources in different digital formats.
- 9) Efficient production and distribution would be enhanced by establishing file repositories (in local authorities and also nationally) to store digital versions of materials. At the present time the most suitable format is one which can be reliably created and edited using Microsoft Word, since most accessible digital formats can be generated from Word.

⁴¹ Incidental Obligatory Accessibility,
http://callcentre.education.ed.ac.uk/digitalcurriculum/downloads/session12/index_files/textmostly/slide14.html

Background to Section 10

In this section of the report we consider the accessibility of different alternative formats for pupils with different types of additional support need. We look at the accessibility of:

- printed formats (text, tactile and symbolised);
- audio formats (tape, CD, digital files);
- digital computer formats (such as PDF, Daisy, HTML);

for pupils with difficulties with regard to:

- reading;
- seeing;
- understanding;
- holding the book and turning pages;
- writing and recording.

Sections 5 to 9 have shown that different groups of pupils require curriculum resources and information in different mediums and formats. Guidance issued by SEED to local authorities and other responsible bodies recommends:

“In considering barriers to full participation in the curriculum and short, medium and long-term priorities, responsible bodies must consider pupils with different types of disabilities. They should look in turn at the needs of pupils with: communication difficulties, specific learning difficulties (e.g. dyslexia and developmental co-ordination disorders, including dyspraxia), other learning difficulties, specific language impairment, autistic spectrum disorders, hearing impairments, visual impairments and physical disabilities/motor impairments.” and that “Information may need to be provided in alternative forms, such as: providing information orally (for example, to ensure that a pupil has understood information provided on posters or in their timetable), in Braille, in large print, in audio formats, through ICT, through sign language (either on video or by using appropriately qualified teachers or auxiliary staff) or through a recognized symbol system (such as Makaton).”

(Scottish Executive 2002, para 50).

There are numerous other examples of policy documents that recognize the range of accessible formats that is required.

A report commissioned by the Scottish Executive Social Exclusion Unit notes that “there is no ‘one size fits all’ formula for effective provision of information for disadvantaged groups, and that different approaches can benefit different people” (Rosengard *et al*, 2007), while the Draft Strategy for Scotland’s Languages recommends that “Scottish public bodies should seek to provide access to high quality translation, interpretation and communication support (tics) services in order to ensure fair and accessible services for everyone. Language should not act as a barrier to awareness of, or access to, services and opportunities by considering the needs of the target audience and ensuring that information and publicity material is available in a range of languages and formats.” (Scottish Executive 2007).

Accessibility of printed, audio and computer formats

Table 10.1 offers an overall analysis of the accessibility of different formats for different groups of pupils with additional support needs. The accessibility scores include weighting for applicability, so Braille, for example, has a low score for most groups of children apart from those with significant visual impairment. The total scores reflect the overall applicability and accessibility for all children with literacy support needs.

The scores given are subjective, based on the judgment of the authors. We could not find reliable research which analyses the accessibility of these different formats. This is partly because different users have widely varying requirements, and partly because accessible formats do not guarantee accessible resources. A well-designed and structured digital document in most formats will be reasonably accessible for most users, whereas poorly composed resources are likely to be less accessible for everybody, regardless of the format. For example, a digital file which has structure (i.e. a table of contents with hyperlinks to chapters and sub-sections) is much more accessible for users with physical or visual impairments, but it is also more accessible for most readers because the user can skim the contents of the book and easily navigate between sections.

The digital formats are all rated on the basis that we are dealing with a standard text document, and consequently, are not very accessible for students with learning difficulties who do not use text or who have difficulty manipulating digital documents. Had we scored Word, PDF, HTML and Daisy books on the basis that they had symbols then scores would be higher. Clicker resources have the highest score because they offer a wide range of text, pictures and symbols and they are accessible to keyboard, mouse/pointing device and switch users.

SECTION 10

Table 10.1 Accessibility of alternative formats (1=very poor; 5=satisfactory, 10=very good; Word and PDF scores are for structured/tagged files)

Main Impairment	Printed Formats						Audio Formats				Digital multimedia formats						
	Different font	Large print	Coloured paper	Simplified language	Braille / Moon	With symbols	Tape	Audio CD	Daisy audio	MP3	Plain Text, RTF	HTML	Word*	PDF*	eBook	Clicker	Daisy text
Significant hearing impairment	5	5	5	9	1	7	1	1	1	1	4	5	7	7	7	7	7
Significant visual impairment	5	9	7	8	9	3	5	6	9	7	2	5	7	7	3	5	9
Significant physical or motor impairments	1	1	1	2	1	4	4	3	3	3	5	5	6	6	6	8	6
Significant language and speech disorder	5	5	5	7	1	7	4	4	4	4	3	4	4	4	4	7	4
Autistic spectrum disorder	6	6	6	7	1	8	4	5	5	5	4	5	5	5	5	6	5
Social, emotional and behavioural difficulties	5	5	5	5	1	5	5	5	5	5	4	5	5	5	5	5	5
Learning difficulties:																	
Moderate	6	6	5	7	1	7	5	6	6	6	5	5	6	6	6	7	6
Severe	4	4	3	6	1	8	4	5	5	5	4	4	4	4	4	7	4
Profound	1	1	1	2	1	9	2	2	2	2	1	1	1	1	1	7	1
Specific language and/ or maths (incl dyslexia)	7	6	7	7	1	5	5	7	5	7	5	6	8	7	6	7	6
Complex or multiple impairments:																	
Dual sensory impairment	1	1	1	2	5	4	1	1	1	1	1	1	1	1	1	3	1
Moderate learning diffs & significant additional impairments /disorders	3	3	3	5	1	5	4	5	5	5	4	5	5	5	5	7	5
Severe learning diffs & significant additional impairments / disorders	2	2	2	4	1	6	3	4	4	4	3	3	3	3	3	7	3
Profound learning diffs & significant additional impairments / disorders	1	1	1	3	1	7	2	2	2	2	1	1	1	1	1	3	1
Total	52	55	52	74	26	85	49	56	57	57	46	55	63	62	57	86	63

Printed Formats

Learning resources can be made accessible in different printed formats, from alternative 'alphabets' designed for touch rather than sight (Braille and Moon), to simple adaptations to existing print such as enlarging by photocopying. It is not possible, nor would it be helpful, to explore all formats in detail in this section and other sections of the report also describe the formats; here, we will consider accessibility of printed formats.

Printed text formats

Accessibility for pupils with difficulty reading

The appearance of the text can have a huge impact on readability. Books and worksheets that are printed in relatively small serif fonts such as Times New Roman can be hard for pupils with reading difficulties to read. Altering font, size, letter and line spacing, the quantity of text, and text and background colours can all improve readability, reading rate and understanding.

Many pupils with visual-perceptual difficulties find some fonts much more difficult to read than others^{42 43}. In general, most researchers and authoritative sources recommend the use of san-serif fonts because the serif can alter the appearance of the basic letter shape and therefore make the letter more difficult to recognise and read. The size of the font is very important and generally a minimum of 12 point is recommended. The length of the ascenders and descenders is another significant factor – when these are longer the word shape is more defined and easier to recognise. Some teachers and pupils prefer fonts that are similar to handwriting, such as Sassoon or Comic Sans, although others find these fonts over-bold or 'childish'.

There are fonts designed specifically for pupils with dyslexia, such as Read Regular⁴⁴ and Lexia Readable⁴⁵ which in addition to the features noted above, also have letter shapes designed to minimise letter reversals (e.g. confusion between 'b' and 'd') and combinations (e.g. misreading 'rn' and 'm'). Read Regular and Sassoon must be purchased; Lexia is free for individual use while publishers are charged a small fee.

Of the free, readily available fonts, the following are recommended: Arial (PC), Comic Sans, Geneva (Mac), Helvetica or Arial (Mac), Myriad Pro, Tahoma, and Trebuchet. Verdana was designed to be read easily at any size, also online.

Left-aligned, non-justified text, with a line spacing of 1.5 or 2 lines; avoiding large paragraphs or blocks of text, and the use of non-bleached white paper (such as pale yellow, beige or blue) are recommended. Diagrams and illustrations are useful (provided they are not overly 'busy') to aid comprehension and break up the text.

⁴² Dyslexia Style Guide, BDA, <http://www.bdadyslexia.org.uk/extra352.html>

⁴³ Typefaces for Dyslexics, <http://www.dyslexic.com/fonts>

⁴⁴ Read Regular font, <http://www.readregular.com>

⁴⁵ Lexia Readable, <http://www.k-type.com>

Accessibility for pupils with difficulty seeing

An important concern for pupils with a visual impairment only (i.e. who do not have other impairments), is the size of the font though other factors do come in as well. RNIB recommend 12 or 14, and many pupils who require large print will need 18 point or larger. Highly stylised typefaces should be avoided, but most standard fonts are acceptable. It is helpful to use line spacing of 1.5 to 2 and left-aligned, non-justified text is also recommended.⁴⁶ A high contrast between text and paper is desirable – black on white, or black on yellow – on matt or uncoated (non-glossy) paper. A simple layout with all text and navigational aids such as headings aligned to the left aids access. The use or otherwise of illustrations also varies – in some cases illustrations are removed and replaced by text.

There are therefore some similarities and some differences between printed formats designed for children with visual and reading difficulties, which are summarised in Table 10.2.

Feature	Visual Impairment	Visual dyslexia/visual stress
Size of print	14 point minimum, up to 36 point	At least 12 point
Line spacing	1.5 to 2	1.5 to 2
Font	Sans serif preferred	Specific sans serif fonts with particular characteristics
Colour	High contrast black on white/black on yellow; but individual preference	Off white - range of colours required - pastel paper is popular
Graphics	Large graphics, remove graphics or produce raised diagrams, or text descriptions	Standard size graphics
Layout	May need simplified layout, print on A4 pages	May need simplified layout, print on A4 pages
Content	May required simplified language	May required simplified language

Table 10.2: Comparison between printed formats for pupils with visual impairment and visual dyslexia

Consequently, printed materials produced for children with a visual impairment will not necessarily suit those with other print disabilities, and vice-versa. In fact, the main similarity between printed materials for print-disabled children is the variability and the need for materials to meet the individual needs of the pupil. Just as different children with a visual impairment require different sizes of font (e.g. one pupil may be able to read 14 point, while another may need 36 point), so one pupil with visual perceptual difficulties may prefer 14 point Comic Sans on pale yellow paper, while another may use 12 point Lexia on green paper.

Large print and adapted print materials must therefore be created for the individual child and to suit the material in question.

Accessibility for pupils with difficulty understanding

The main accessibility issue for pupils with difficulty understanding is the complexity of language and readability of the text itself. Simplified text materials are accessible to a very wide range and a very large number of pupils with mild

⁴⁶ RNIB clear print guidelines, http://www.rnib.org.uk/xpedio/groups/public/documents/publicwebsite/public_printdesign.hcsp

and moderate learning difficulties, hearing impairment, visual impairment as well as specific learning difficulties. Materials with complex vocabulary are not accessible.

Accessibility for pupils with difficulty holding the book

Pupils with physical difficulties may have significant difficulties holding a book or turning the pages: printed materials are therefore by definition inaccessible to these pupils. These pupils can only access printed books with help from another person, or by using a mechanical page-turner at a cost of between £2000 and £3400⁴⁷.

Accessibility for pupils with difficulty writing and recording

Printed text formats for pupils with difficulty writing and recording can be by definition challenging: pupils with physical, dyspraxic or visual difficulties may have problems hand-writing; other pupils have difficulties with spelling, grammar and punctuation; children with more complex learning difficulties may not be text users at all.

Tactile formats (Braille and Moon)

Accessibility for visually impaired pupils

Braille and Moon are tactile codes to represent letters, numbers and other characters, used by blind and visually impaired people. There are two types of Braille: Braille 1 is simpler and each letter of the alphabet and number is represented by a combination of six dots that can be felt; Braille 2 uses 'contractions' to represent common letter patterns such as 'ing', 'and' or 'able'. Braille 2 has the advantage of using up to 25% less paper than grade 1 Braille. Braille can be used for signage, on watches and clocks, on maps and diagrams and on appliances and games and toys, as well as for reading and writing. The Moon alphabet is made up of 14 raised characters used at various angles, each with a clear bold outline. For many elderly blind people especially, Moon is easier to learn than the more complex Braille system, although some people gain confidence from learning Moon to move onto Braille.

In terms of accessibility, Braille and Moon are accessible to pupils with severe visual impairment, with good motor control and relatively good language and literacy skills: they are therefore not accessible or applicable to the majority of visually impaired pupils, who have additional difficulties.

Accessibility of tactile formats (Braille and Moon) for pupils with other difficulties (reading, understanding, holding the book)

Braille and Moon are not designed for, and therefore not generally appropriate or accessible to pupils with other additional support needs.

Printed Symbol Formats

Pictures and symbols have been used for communication and to write and record for thousands of years, but it is only relatively recently that learning materials with symbol 'systems' have been used on a large scale in education. Over the past

⁴⁷ Page Turners, QED, <http://www.qedonline.co.uk>

decade or so the use of symbols has in some respects revolutionised access to the curriculum for many children with additional support needs. In most special schools and units, and many mainstream schools, symbols are used routinely to clarify and add meaning to text. Symbol systems are used by education, speech and language therapy, social work and health professionals in a range of settings and contexts (Wilson, 2003). The primary cause of this explosion has been the availability of computers and printers and development of software that enables high-quality symbol-supported resources to be created quickly and relatively cheaply.

“Symbols can help support:

- communication - making a symbol communication book can help people make choices.
- independence and participation - symbols aid understanding which can increase involvement, choice and confidence.
- literacy and learning - symbol software encourage users to "write" by selecting symbols from a predetermined set in a grid.
- creativity and self expression - writing letters and stories and expressing your own opinions.
- access to information - all of us need accessible information and this should be presented in such a way that the reader can understand and use.”

from *An Introduction to Symbols*⁴⁸

There are many different symbol sets but the most popular symbols in use in Scottish education are the Picture Communication Symbols from Mayer-Johnson shown in Figure 10.1, and the Widgit Rebus symbols from Widgit Software, seen in Figure 10.2.



Figure 10.1: PCS Symbols



Figure 10.2: Widgit Rebus Symbols

Learning resources with symbols are accessible to a very broad range of learners, particularly when combined with text, because the process of creating a symbol

⁴⁸ An Introduction to Symbols

http://www.widgit.com/symbols/about_symbols/intro_2_symbols/index.htm

resource will usually involve simplifying the text, which can immediately make it more accessible to many more pupils. Symbol-supported learning resources are used by pupils:

- with speech and language difficulties;
- with autistic spectrum disorder;
- with learning difficulties;
- with hearing impairment;
- with severe and complex difficulties.

Accessibility for pupils with difficulty reading

Good readers do not usually need symbolised materials but the addition of symbols can clarify the meaning of text for some children with reading difficulties.

Accessibility for pupils with difficulty seeing

Symbols can be printed in almost any size and the most common symbols sets are available in both colour and black and white. Some consider that the latter may provide greater contrast for children with visual impairment.⁴⁹ The majority of printed symbols are not particularly accessible for blind pupils since they are a visual medium. A significant percentage of visually impaired pupils have additional learning difficulties and so symbolised materials are an important resource for these children.

Accessibility for pupils with difficulty understanding

The main group of children who benefit from symbols are those who have difficulty understanding text. Pupils with mild and moderate learning difficulties; speech and language impairment; severe and complex difficulties; and those on the autistic spectrum can all access symbolised materials.

Accessibility for pupils with difficulty holding the book

Children who have difficulty handling printed materials will also have reduced access to printed symbol materials, and would need digital versions accessible via computer.

Accessibility for pupils with difficulty writing/recording

Pupils who have significant writing and recording difficulties can use symbols as an alternative to text. Examples would be a child demonstrating understanding by identifying symbols in response to spoken questions or constructing 'sentences' with symbols (see Section 9). Children can access symbols physically (picking them up or pointing to them); or by eye-pointing, for example. The use of symbols for writing/recording requires the appropriate symbols to be printed and available - pupils do not draw the symbols themselves. Children can also write with symbols on computer, selecting the symbols via mouse, touch screen or switch.

⁴⁹ Debate continues over preference for colour versus black and white, (see Aitken, A, Millar, S.V., Nisbet, P.D. Applying the new medical model: intervening in the environment of children who are multiply disabled. *British Journal of Visual Impairment*, 19:2, ISSN 0264 6196. 2001.)

Audio formats

Audio compared to written text has advantages and disadvantages: some pupils find audio enhances learning; but clearly some concepts and ideas are better suited in many cases to visual representations.

Cassette Tape

Audio tapes have been used for many years to enable access to curriculum materials for students with additional support needs. Audio cassettes are relatively inexpensive to copy and distribute, while portable players to access tapes are extremely cheap.

Accessibility

Tape players are accessible for many pupils with visual impairment, reading and learning difficulties. Simple adaptations to tape players⁵⁰, or the use of Environmental Control Systems⁵¹ allow students with physical difficulties to access taped materials. Despite the development of audio CDs and digital audio files, cassette tapes are still extremely popular due to their simplicity and accessibility. The main disadvantages of cassette tapes are size; fragility and particularly difficulties with navigation – the user cannot easily find particular sections on the tape. Tape recorders provide an accessible medium for many children with writing and recording difficulties because it is cheap and easy for them to record with speech. However, cassette tapes and recorders are becoming less common with the advent of audio CD and particularly, of iPods and MP3 players.

Audio CD

Audio CDs have many of the advantages of cassette tape, but are more durable and navigation is quicker and easier. Audio CDs can be played on car music systems, computers and cheap personal CD players.

Accessibility

The accessibility of audio CDs depends on the type of player used. Many visually impaired pupils and children with reading and learning difficulties can access personal audio CD players easily. It is slightly more difficult to modify a personal CD player for a switch user, compared to a tape recorder, but switch-accessible CD players are available for around £100⁵². Free keyboard, mouse or switch-controlled software to play CDs on computer is available from Inclusive Technology⁵³. Audio CDs are not a particularly accessible format for children with writing and recording difficulties because few CD players have recording capability.

⁵⁰ Using a switch to control devices, <http://ace-north.org.uk/pages/resources/infosheets.asp>

⁵¹ Life Skills & Environmental Controls,

<http://www.qedonline.co.uk/catalog/index.php?cPath=86&osCsid=f6801b9a93b8454031c0e82c2c1da861>

⁵² Switch-Adapted CD Player, <http://www.liberator.co.uk/liberator/InclusionDevices.asp>

⁵³ Inclusive CD Player, <http://www.inclusive.co.uk/downloads/downloads.shtml>

Daisy Digital Talking Books

Daisy is the new Digital Talking Book format that has been adopted by RNIB and many other organisations supporting people with visual impairment. The main advantages of Daisy, compared with a standard audio CD, are that:

- it is an international, published standard;
- the file sizes are smaller (so longer recordings can be stored on a single CD – although this is because files are compressed using MP3, for example, not because of the Daisy format itself);
- Daisy CDs have structure and navigation that enables a blind user to move easily around and find chapters, sections and even individual words.⁵⁴

A Daisy talking book consists of a set of audio files (often but not necessarily in MP3 format) together with 'index' files which can be spoken out by the player so that a user can navigate around the book. Daisy talking books can be accessed either on personal portable Daisy players, or with specialist software on computer. The portable Daisy players are essentially modified versions of standard MP3 CD players.

Accessibility

The Daisy audio format is designed for and particularly accessible to pupils with visual impairment. The built-in structure and access tools allow a pupil to navigate around the book and search and find information quickly. Daisy audio books are less accessible for children with other print disabilities. This is not because of the characteristics of the format itself, but more as a result of lack of access to Daisy hardware and books.

The main disadvantages of Daisy audio books for pupils who are not visually impaired, are that the Daisy audio players are not readily available and are very expensive (the cheapest player from RNIB is £195, compared to around £20 for a CD MP3 player from a local electrical retailer). Visually impaired pupils can join the RNIB Talking Book service and for £70 per year (usually paid for by the local authority) receive a free Daisy player with free access to the Talking Book library which has over 9,500 Daisy titles, but this service is not available to children who are not visually impaired⁵⁵. Although Daisy Talking Books are available at low cost for pupils with visual impairment, they are not easily available to pupils with other print disabilities.

For pupils who are not visually impaired, Daisy Talking Books are less accessible than standard audio CDs or downloadable audio files; the players are more expensive; the books are not available; and most children with sight do not need the Daisy navigation features because they can see the player buttons or screen on a standard CD or MP3 player.

Daisy players based on modified MP3 players can be used for recording purposes by children who have writing or recording difficulties - the recording is saved as an

⁵⁴ Daisy technology explained,

http://www.rnib.org.uk/xpedio/groups/public/documents/publicwebsite/public_daisy.hcsp

⁵⁵ RNIB Talking Book Service,

http://www.rnib.org.uk/xpedio/groups/public/documents/PublicWebsite/public_talkingbooks.hcsp#P70_4636

MP3 file. Daisy players which are based on modified personal CD players cannot be used for recording.

Digital audio files (MP3)

The development of MP3 players such as the Apple iPod has led to an explosion in the availability of downloadable music, 'podcasting' (radio or other broadcasts delivered via the internet for listening to on an MP3 player) and also downloadable audio books. A popular supplier of downloadable audio books in the UK is Audible.com (<http://www.audible.com>), with over 11,000 titles available, and other sites in the UK are the Apple iTunes store (<http://www.itunes.co.uk>), Naxos Audiobooks (<http://www.naxosaudiobooks.com>), and Audioville (<http://www.audioville.co.uk/>). As well as commercial audiobooks, there are a huge number of free audiobooks, radio programmes and other audio files that can be downloaded from the internet and played on computer, listened to on iPods, MP3 players and mobile phones, and burned to CD and played on portable CD players.

Schools are increasingly using iPods and other MP3 players for classroom activities⁵⁶, and to distribute learning materials. Staff and pupils use free software such as Audacity⁵⁷ to create their own audio recordings and programmes, which can then be made available on the internet and downloaded by pupils. Making voice recordings takes time, so a new faster alternative is to use computer software to generate an audio recording of a document with a synthesised voice. This approach is not suited to some materials such as novels, for example, because the artificial voices lack feeling and intonation, but it is a suitable technique for creating shorter more factual recordings. Software to create such audio files is available commercially and the new version of the free WordTalk software, funded by SEED and which will be available in 2007⁵⁸, will have this capability.

Accessibility

Accessibility depends in part on availability and the huge quantity of audio material in MP3 is a major factor in making such resources accessible, together with the number of devices which can play the audio files: computer; portable MP3 players; mobile phones; handheld PDAs etc. The accessibility of the players themselves varies greatly from model to model, but devices like the ubiquitous iPod are accessible to the majority of pupils with additional support needs. There is no doubt that the navigation features of Daisy mean that Daisy audio books are more accessible for many visually impaired users than ordinary MP3, but nevertheless, iPods, standard MP3 players, mobile phones and PDAs are usable by people with visual impairment⁵⁹ and devices for visually impaired pupils such as the BookCourier⁶⁰ can play both MP3 and Daisy audio books. For people with learning difficulties or physical difficulties, RNIB's Milestone 311⁶¹ player is simple to use with large buttons. Options for switch users to control MP3 players are

⁵⁶ Podcasting, <http://www.ltscotland.org.uk/ictineducation/ictadvice/Podcasting/introduction.asp>

⁵⁷ Audacity Sound Recorder/editor, <http://audacity.sourceforge.net/>

⁵⁸ WordTalk free text reader for Microsoft Word, <http://www.wordtalk.org.uk/>

⁵⁹ Blackpool TrEACL project, <http://www.aclearn.net/display.cfm?resID=11983>

⁶⁰ BookCourier, <http://www.accessableworld.com/bookcourier/>

⁶¹ Milestone 311, <http://onlineshop.rnib.org.uk/>

limited but there is an adapter available for controlling an iPod with a single switch⁶².



Figure 10.3 Switch-controlled iPod

MP3 players and iPods are reasonably accessible for pupils who have writing and recording difficulties: many cheap MP3 players have a voice recording capability and microphones are available for iPods.

Digital text / multimedia formats

There are many formats suitable for distributing digital curriculum materials, such as Microsoft Word, Adobe PDF, Microsoft or MobiPocket Reader, HTML (web pages) and DAISY. In this section we will describe the main accessibility characteristics of different formats. We have chosen a sub-set of formats – there are many more that can be used to create accessible materials – for example, Microsoft PowerPoint and Opus Illuminatus are both commonly used to create ‘talking books’ on computer⁶³.

Plain text and RTF

Plain text

Plain text is the most basic type of digital format. Plain text is exactly that: a text file with line breaks and carriage returns but no formatting, structure (headings etc), tables or graphics. In some respects plain text is extremely accessible, since virtually all word processors on a huge range of computers and devices can open a text file, and because virtually all assistive software packages (e.g. text and screen readers) can access plain text. However, accessibility is not the same as usability, and the lack of structure and other information makes plain text hard to use: a blind user of a screen reader program, for example, faced with plain text, has little option than to begin at the beginning of the file and work through it. While the screen reader will read the text without any difficulty, it will take a long time: if the document had structure with chapter headings that could be read first, then the reader could listen to the outline of the document and then decide which sections to read first.

⁶² SwitchPod switch-accessible iPod, <http://www.tecsol.com.au/SwitchPod.htm>

⁶³ Creating switch accessible multimedia, <http://atschool.eduweb.co.uk/meldreth/textandinfo/Powerp/Media1.html>

RTF (Rich Text Format)

RTF offers formatting and allows graphics to be saved, but there is little facility for structure or navigation or features such as tables. RTF files can be opened by almost any word processor. Like plain text, RTF is very accessible but is not particularly usable.

There are many documents that are stored and made available in plain text, RTF and other basic formats, but in the main they should be viewed as source texts or intermediate files, which are of little use in their 'native' form. To be accessible and useful, they usually have to be converted or adapted into a more useful format which offers structure and navigation and a means of dealing with features such as pictures and tables.

HTML

HTML is the original underlying format of the web and as we know it can be used to display pages with considerable complexity, with different fonts, sizes and colours; columns and tables; graphics, sound and video clips; and hyperlinks.

HTML documents can be opened and read using a large variety of browsers such

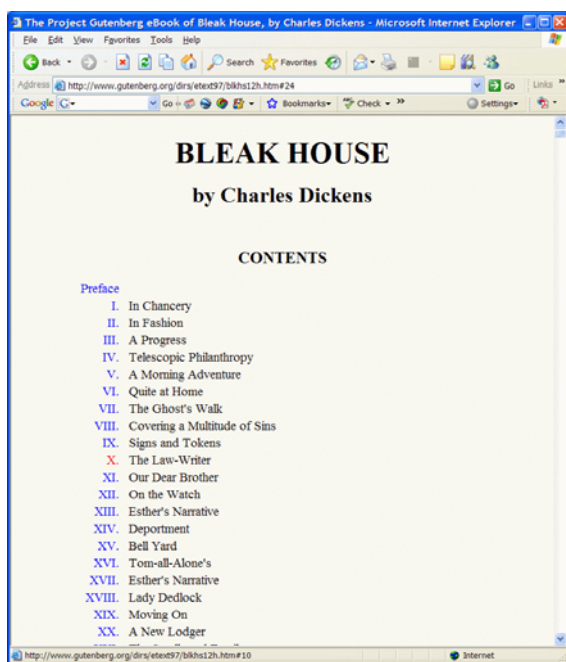


Figure 10.4: Bleak House, By Charles Dickens, available free in HTML from Project Gutenberg. The document is structured with a table of contents as hyperlinks so the user can jump to any chapter with a single click or switch press.

as Internet Explorer, Firefox or Safari, as well as most word processors used in schools such as Microsoft Word, Textease and AppleWorks. HTML documents can be created using almost any word processor and with many free and commercially available editors.

Accessibility

The flexibility of HTML means that some pages can be very accessible, while others can be extremely inaccessible, depending on the designer or author. A well-structured HTML document is both accessible and usable; a poorly designed HTML page can be impossible to access for someone who is using assistive technology (or anyone else).

The W3C consortium has published guidelines for making accessible web and HTML pages⁶⁴. An HTML document which follows W3C guidelines should be structured; illustrations will have text

descriptions; and tables can be marked up to make sense to screen readers. As a format, HTML seems to be regarded as more accessible than Word or PDF⁶⁵ but we believe that this comparison is based on several assumptions about accessibility where the focus is on online documents to be accessed by a person with visual impairment. If we take a wider view, we believe that Word and PDF have some advantages over HTML. For example, although it is possible to save

⁶⁴ W3C World Wide Web Consortium, <http://www.w3.org/>

⁶⁵ How accessible are Microsoft Word documents?
<http://www.washington.edu/accessit/articles?266>

and distribute an HTML document on CD say, rather than online (e.g. Daisy text books are composed of HTML pages) and open it using either browser or word processors, different applications process the file in different ways and the result is not always accurate (e.g. illustrations may not be shown). Bookshare, the US web site that distributes accessible books for print-disabled people, no longer accepts books in HTML format: “HTML and DAISY offer markup, but because they can be created in so many different ways, users are served best when we generate these files for Bookshare.org subscribers using internal tools.”⁶⁶

Bookshare does accept files in RTF and Word formats.

Computers used by students with additional support needs are not always connected to the internet in Scottish schools. For example, at least one local authority in Scotland will not allow laptops to connect wirelessly to the school internet, which restricts access for the pupil who relies on the laptop to obtain digital resources, while many Support for Learning departments use standalone computers because ICT services restrict access to control panels or refuse to install specialist assistive software (despite the fact that this is likely to be illegal under Disability Equality legislation). Therefore, there is a need for digital books to be distributed as distinct files on CD or memory stick as well as online, and Word or PDF are more convenient formats.

There is also a distinction to be made between the file format and the application used to read the book. Most browsers have relatively basic features and tools whereas applications designed to handle digital books and resources such as Microsoft Word, Microsoft Reader, Adobe Reader or Daisy book readers have extra facilities to support reading (e.g. text to speech), study (e.g. highlighting, bookmarks, voice and text comments) and writing (e.g. spellcheckers). A basic HTML format document may well be accessible but browsers may lack the additional features and tools that make the resource usable.

Microsoft Word (DOC)

There are probably more worksheets and documents in Microsoft Word format in Scottish schools than in any other electronic format. 5-14 and NAB assessments are available in Microsoft Word format. The Microsoft Word software is widely available, ideal for creating interactive worksheets, and documents are reasonably accessible using assistive technology (e.g. CALL Centre’s recent SEED-funded project to distribute *WordTalk* freely to schools offers free text-to-speech to help pupils with reading difficulties access Word documents). Creating and opening documents and materials in Word generally costs nothing because it is installed already on most computers in Scottish education. Word documents can also be opened by a wide variety of other free programs such as OpenOffice and StarOffice⁶⁷ (freely available to Scottish Education under a licence negotiated by SEED with Sun Microsystems). Versions of Microsoft Word are available on Windows PCs and Macs.

Accessibility

Microsoft Word as a format is reasonably accessible, but a problem is that many documents written using Word are not.

⁶⁶ Bookshare, <http://www.bookshare.org/web/Welcome.html>

⁶⁷ StarOffice, <http://www.sun.com/software/star/staroffice/> & <http://www.ltscotland.org.uk/edresources/software/schemes/index.asp>

On the positive side, Microsoft Word documents can be adjusted to suit children with difficulty reading or seeing: the text can be magnified and re-flowed (i.e. the words 'reflowed' to fit the size of the window); font style and size altered; line and character spacing increased; text and background colours adjusted; and the Word Reading Layout provides a simple and accessible view for reading books and materials.

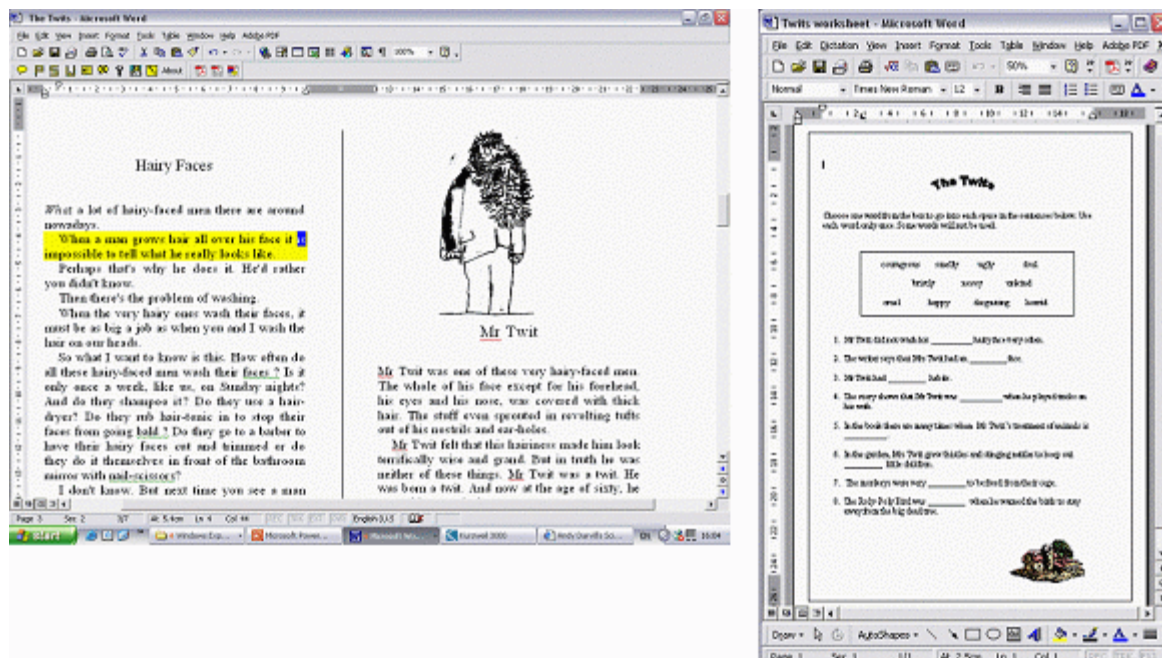


Figure 10.5: Reading book with worksheet scanned into Word and read out using free WordTalk software

Pupils with reading or visual difficulties can use additional software, such as WordTalk, to read out the text from the screen. Microsoft Word has tools which are helpful for study such as electronic highlighting, bookmarking and commenting. Most screen readers and screen magnification programs used by pupils with visual impairment can access Microsoft Word documents. Microsoft Word is a very effective format for children who have writing and recording difficulties because, since it is a word processor, text can be inserted easily and Word has a whole range of tools to support writing, such as spellchecker, thesaurus, AutoCorrect, and the equation editor⁶⁸. Lastly, alternative access tools such as word predictors and speech recognition programs work well with Microsoft Word.

The main disadvantage with Microsoft Word format as a means of distributing electronic documents is that there is wide variation in the content, design and layout of documents. It is possible to create a document in Microsoft Word which is extremely accessible to a very wide range of children with additional support needs, but it is equally possible to create a document which is very inaccessible. The terms Incidental Obligatory Accessibility (IOA)⁶⁹ or Accessibility Without

⁶⁸ Supporting Literacy Using Microsoft Word, http://callcentre.education.ed.ac.uk/About_CALL/Publications_CAA/Quick_Guides_CAB/quick_guides_cab.html

⁶⁹ Incidental Obligatory Accessibility, http://callcentre.education.ed.ac.uk/digitalcurriculum/downloads/session12/index_files/textmostly/slide14.html

Trying (AWOT) have been suggested to describe using facilities built into Microsoft Word (and other tools such as Adobe Acrobat or web design software) to create accessible documents. A simple example of Incidental Obligatory Accessibility is to use Word styles to create structure for a document rather than just changing the format of the text. By using Word styles for chapter and section headings, pupils with difficulties reading, seeing, understanding or physically accessing the document can use the Word 'Document Map' to easily navigate around the document; blind users with screen readers can skim the chapter heads and easily find sections; and pupils with physical difficulties can use mouse, keyboard or switch to go directly to a chapter, from the table of contents at the beginning of the document.

Word is one of the most useful and efficient tools for creating accessible documents in other formats. Word styles and headings can be used to define structure, alternative text can be added for images, and the resulting file can be saved in a variety of formats including RTF, HTML⁷⁰, PDF, Microsoft Reader, and Daisy⁷¹. Structured materials created using Microsoft Word can therefore be converted into almost any other format. A disadvantage with Word compared to PDF, for example, is that files do not contain sufficient information for use in commercial printing.

Adobe PDF

Globally, there are probably more PDF documents in existence than in any other digital format. Governments, organisations and publishers use PDF as their preferred format for distributing documents. For example, 5-14 assessments, NABs and SQA examination question papers are all produced in PDF. Publishers like PDF because they can quickly and cheaply produce a digital file for printers to use to create a reliable hard copy, from virtually any source program, whether it is a desktop publishing package, a word processor, or a spreadsheet. This means that publishers will often be willing and able to provide a PDF book for use by a pupil with additional support needs.

Where publishers cannot provide PDFs, books can be scanned and scanned PDF files of textbooks are generally more accurate than Word or HTML files.

PDF is good for distributing textbooks, novels, reports, and documents can be made interactive through the addition of 'form fields' (as in the case of the CALL Centre / SQA digital question papers project). PDFs can be read on a large number of different machines, including Windows, Macs, Unix and also pocket PC/PDA devices, using free Acrobat Reader software.

Creating a PDF document is relatively low cost: StarOffice, available free to Scottish Education, can export PDF documents; while the full Adobe Acrobat Professional 7 will cost a Scottish school £19.80 for a licence and £19 for the software CD, from Learning and Teaching Scotland.

Most schools in Scotland use Microsoft Word or equivalent to produce course materials, workbooks and worksheets and creating PDFs from Word is simple and low cost. An added advantage is that the PDFs generated in this way are 'tagged'

⁷⁰ Create Structured Documents in Microsoft Word, <http://www.webaim.org/techniques/word/>

⁷¹ Boston University Office of Disability Services DAISY Production Training Module
<http://people.bu.edu/access/Introduction.htm>

and therefore reasonably accessible provided basic accessibility procedures are followed when creating the material.

Book sellers such as WH Smith have started selling 'eBooks' in PDF (<http://ebooks.whsmith.co.uk>) and there are many classic texts (e.g. by Robert Louis Stevenson, Dickens etc) available as free Adobe eBooks on the internet (<http://www.adobe.com/epaper/ebooks/ebookslib.html>).

Accessibility

PDF documents can be accessible for pupils with additional support needs but, like web sites or Word documents, some PDF documents are more accessible than others for some users. There are two main classes of PDF documents: those which are 'untagged', where little or no effort has been made to ensure accessibility, and those which are 'tagged'. Tagged PDFs are structured (the headings for sections, for example, can be seen in the 'Bookmarks' tab and listened to using a screen reader); the 'reading order' of the text is defined so that a text or screen reader reads it in the correct order; graphic elements have text descriptions; the text language is defined so that the correct characters are used.

Popular opinion divides PDFs into those which are accessible (tagged) and those which are not (untagged) but in fact this is misleading. The term 'accessible' when used to discuss digital documents too often means 'accessible to blind or visually impaired users'. Untagged PDFs may not be accessible to some pupils who are visually impaired and use screen readers but they may be entirely accessible for children with physical or reading difficulties, for example. Equally, PDFs (or documents in other formats) which are accessible for blind pupils using screen readers may or may not be accessible to pupils with severe physical disabilities who use switches.

The new SQA digital question papers are a good example of this in practice. The digital question papers are untagged, but they have still proven to be accessible to the majority of students who require them (Nisbet *et al*, 2006). Pupils with physical writing and recording difficulties can navigate around the papers and type answers on screen, while those with reading difficulties can use PDFaloud text to speech software. The question papers may or may not be accessible for blind pupils who use screen readers, but if they are not, SQA extract the text and edit it to create a digital paper in another format (HTML, Word, RTF or Daisy) that could be accessed using the screen reader. (This process is used already by SQA to create the text files used for Braille papers.) Creating different accessible formats to meet the needs of different users is entirely reasonable: the untagged PDFs meet the needs of the majority of pupils and other methods are used for the small number of pupils who require different formats. One might argue that SQA should ensure that *all* the papers should be produced in *one* digital format that is accessible to *every* pupil, but that would be unnecessarily expensive (SQA would have to change their entire desktop publishing software and procedures, and retrain staff) and arguably, impossible as no single digital format meets the needs of every pupil. There are parallels here with production of printed papers: the majority of pupils can use standard print; some pupils need papers on coloured paper, others require different font sizes, others need Braille. The untagged, speech-enabled PDF question papers are accessible and usable by the majority of candidates with additional support needs and given that SQA know exactly which papers are required by which pupils, in good time, alternative formats that require more time and expense can be created if necessary.

Pupils with reading, seeing or physical difficulties can open any PDF (tagged or untagged) with the free Acrobat Reader program and:

- magnify and reflow the document;
- view one page at a time, or two pages side by side;
- move around and access the document using the mouse, keyboard, or keyboard equivalent;
- change background and foreground colours;
- view the document structure and move quickly around the document using the 'bookmarks' pane;
- automatically open the document at the last page read;
- have the document read using Adobe's built-in Read Outloud tool;
- read the document using a text reader such as PDFaloud.

Visually impaired users may or may not be able to read an untagged PDF with screen readers such as Jaws and HAL, but they are more likely to be successful with a tagged PDF where the reading order is specified correctly, and the document has structure.

PDFs can be very accessible for pupils with writing or recording difficulties: if the PDF has been set up for the purpose, pupils can add highlighting, bookmarks and comments, type in answers to questions, and record voice comments using the free Acrobat Reader.

The main accessibility issue with PDF is the variability in content and design of individual documents - this is the same issue that was identified with HTML, Microsoft Word or Daisy text. Just as it is possible to produce a website which conforms to accessibility guidelines, but is completely unusable, so it is possible to produce a PDF document which adopts accessibility tools but which cannot be accessed properly⁷². Blind users of screen readers, quite rightly, sometimes complain about inaccessible PDF documents. This is because PDF has been around for many years and so documents produced a long time ago may not have any accessibility features; or the PDF author has not built accessibility in to the document; or in some cases, it is because the document was designed for printing and viewing and it is impossible to present it sensibly in an audio form. But this does not mean that PDF as a format is not accessible: authors and publishers should be educated and made aware of the processes involved to create more accessible PDFs.

Another potential difficulty is Digital Rights Management (DRM): it is possible for authors or commercial eBook publishers to add excessive security and DRM which prevents the user from reading the PDF with assistive technology even though this is permitted by copyright law⁷³. This may not be a problem with copyright-free material or resources specifically produced for pupils with additional support needs, but it is when dealing with commercial products where the publisher wishes to restrict copying and distribution of the book.

⁷² PDF Accessibility, <http://www.webaim.org/techniques/acrobat/>

⁷³ Gowers Review of Intellectual Property, http://www.hm-treasury.gov.uk/independent_reviews/gowers_review_intellectual_property/gowersreview_index.cfm

unlike Microsoft Word, it is not possible change the font or colours. Another difficulty is that the free text-to-speech facility will not work if the author or publisher has copy-protected the book, and almost all commercial titles are copy protected.

There are many unprotected and accessible free books that can be downloaded in Microsoft reader format from sites such as the University of Virginia e-book library (<http://etext.lib.virginia.edu/ebooks/>). The maximum font size in a Microsoft Reader book is relatively small and so most books are not particularly accessible for pupils who have a visual impairment. Microsoft Reader books are a reasonable option for children with physical difficulty handling paper materials because they can be navigated and accessed using mouse, keyboard or keyboard equivalent (for example, a switch user can press switches to move backwards and forwards through the book).

In terms of access for children who have writing and recording difficulties, Microsoft Reader books are less accessible than documents in interactive formats such as Microsoft Word or Adobe PDF. While a pupil can add text and voice comments, drawings and bookmarks in MS Reader, both Word and Acrobat are much better formats for creating interactive worksheets or assessments. Microsoft Reader is an electronic book format, like Daisy, and as such it is designed for viewing material rather than interacting and typing answers to questions.

Clicker 4/5

Clicker is an extremely popular British program and 15 licences for Clicker 4 were provided free to each primary school in Scotland, through the Scottish Schools Digital Network (SSDN), in 2004. The latest version 5 is claimed to be installed on over half a million school computers. Crick software, the publishers, distribute a large number of books and resources that can be read with Clicker (<http://www.cricksoft.com/uk/>). For example, electronic versions of Oxford Reading Tree books are available in Clicker format. Schools use Clicker to create their own electronic books and resources and there are hundreds of free grids and resources that can be downloaded from the Learning Grids web site at (<http://www.learninggrids.com/uk/>). There are over 65,000 registered users of Learning Grids.com and so it is a massive and rich source of material. However, the grids that are offered are copyright-free: there are no grids with free Oxford Reading Tree books, for example, because that would break copyright law. A new development – Community Learning Grids – allows schools, groups of schools, local authorities or other agencies to set up protected areas where copyrighted material can be made available to a closed user group under licence.

As well as offering a good format for creating accessible talking books, Clicker's huge advantage over many other formats is that it was originally designed for creating interactive digital resources for pupils with additional support needs: having read a book, the pupil then tackles activities on screen. Creating Clicker books is free (for primary schools that have the software already) or relatively low cost (Clicker 5 is £84 and additional licences are £14 from Learning and Teaching Scotland). Clicker 5 also has the option of using real digitised human speech as well as synthetic speech in talking books, although the Clicker Sayso synthetic speech is extremely smooth and intelligible. Clicker 5 books, like Daisy books, can have human digitised speech where words are highlighted as they are spoken.



Figure 10.8: Postman Pat talking book made in Clicker 4, accessible by mouse or switch

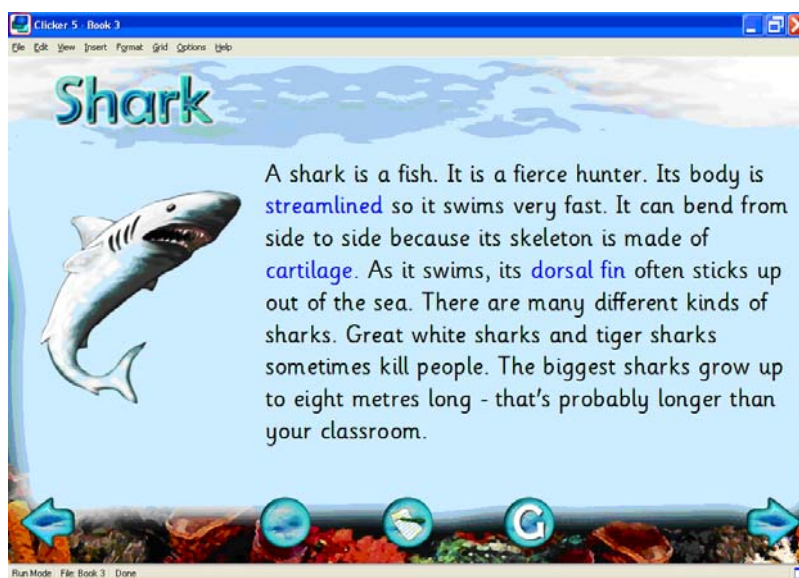


Figure 10.9: Find Out and Write About Clicker resource

Accessibility

Clicker grids and resources can be very accessible to pupils with reading, understanding and physical difficulties. Clicker has built-in text to speech tools for reading pages; symbols can be incorporated for non-readers; and Clicker is one of the few programs designed for and accessible to switch users. Clicker resources may be accessible for pupils with some vision, but many are not designed for and therefore may not be accessible to blind children.

Clicker resources are almost always interactive, so that they are very accessible for pupils with writing and recording difficulties. Pupils can write by clicking on or using a switch to select letters, whole words, phrases and sentences, and Clicker grids can also incorporate word prediction from the Penfriend word prediction program. Clicker is available for both Windows and Mac computers.



Figure 10.10: Clicker 5 Oxford Reading Tree digital talking book and writing activity

DAISY and NISO Z39.86

The DAISY format (Digital Accessible Information System) is specifically designed for visually impaired and blind people. Its strength is that it provides a specification for structuring material so that the user can read and/or listen, navigate and find information quickly using audio cues. Daisy books can be accessed using portable DAISY audio players, as well as displayed and read using computers. It is a developing worldwide standard, which has been adopted in many countries and by many publishers. It is also suitable for giving some students with reading difficulties and physical difficulties access to text. There are 6 different types of Daisy digital talking book (DTB):⁷⁶

- “Full audio with Title element only: no navigable structure.
- Full audio with Navigation Center (NCC or NCX) only: book with structure.
- Full audio with Navigation Center and partial text: with structure as well as some additional text, e.g., index, glossary, etc. The audio and existing text components are synchronized.
- Full audio and full text: A DTB with structure and complete text and audio. The audio and full text are synchronized. This type of production may be used to generate braille.
- Full text and some audio: This is a DTB with structure, complete text, and limited audio.
- Text and no audio: This is a DTB containing a Navigation Center and marked up/structured electronic text only and no audio is present.”

The existence of different types of Daisy books can be confusing for users because it is not always clear what type is available. The RNIB Talking Book service, for example, supplies type 2 audio books only, which are not accessible to a computer user who wants the text. There are also two DAISY standards in use – Daisy 2.02 and Daisy 3.0 – and the specification is still under development, so that not all Daisy readers can open a given Daisy book. (This problem is not confined to Daisy books of course – all digital file formats are constantly being upgraded.)

⁷⁶ http://www.daisy.org/about_us/dtbooks.asp

The most popular programs for creating DAISY books in the UK are Dolphin Publisher and EasyProducer, both from Dolphin Computer Access⁷⁷. Publisher can be used to create Daisy books with a human recorded voice and costs £2,450 (£695 for education/charities). EasyProducer (£348) is designed to make Daisy books from Word documents, but this time with synthetic speech rather than human speech. Dolphin have another product in development – EasyConverter – which is designed specifically for producing accessible alternative formats. EasyConverter will be able to scan paper documents and access digital PDF, HTML, NISO and Word files and produce Structured Word, Large Print (in various sizes), Braille, Daisy audio and MP3 audio. It appears to be a very suitable product for schools, local authority services and others to use for creating accessible resources in multiple formats. It is important to note that this product stores the ‘intermediate’ files (files to be converted into the various print, audio and digital formats) in Microsoft Word format and uses Microsoft Word for editing the files. This supports the recommendations made in this and other sections of Books for All that Microsoft Word is the most suitable format and tool for storing and editing files for creating accessible resources.

Daisy text books can be read using a number of different programs. EasyReader, also from Dolphin (£30), is one of the most popular but other programs can also read Daisy books. DAISY readers for Macintosh or Palm/Pocket PCs are not readily available.

NIMAS

In the US, the DAISY 3 standard has led to development of a proposed standard for the production and electronic distribution of digital versions of textbooks and other instructional materials so they can be more easily converted to accessible formats, including Braille and text-to-speech. The National Instructional Materials Accessibility Standard⁷⁸ (NIMAS) seeks to provide a standard specification for the creation of accessible digital materials. The basic concept is very attractive: a common standard for publishers to use to create digital versions of textbooks, which can then be converted into different accessible formats such as Braille, Large Print, audio and digital formats such as XHTML and Daisy.

NIMAS is a work in progress and NIMAS files require specialist skills and tools to create. A NIMAS 1.1 ‘file set’ is designed as a ‘pre-production’ standard “for use by publishers, authorised entities, and others to produce accessible versions of printed instructional materials. They are not intended to be used as-is and should not be considered finished products.”⁷⁹ Creating a NIMAS file set requires expertise in writing XML documents, and a suitable XML editor. Likewise, converting an NIMAS file set into a format suitable for the end user (e.g. Braille, MP3, Word (DOC)) requires skill and/or specialist software. Very few programs yet exist for converting NIMAS file sets into anything useful (although EasyConverter, which is scheduled for release in 2007 may offer one practical solution).

NIMAS and Daisy are evolving standards and there are different versions and tools currently available; in our opinion, the NIMAS / DAISY format is not yet sufficiently developed or specified, and tools are not yet available, for it to be used

⁷⁷ <http://www.dolphinuk.co.uk>

⁷⁸ <http://nimas.cast.org/>

⁷⁹ Creating NIMAS files, http://nimas.cast.org/about/resources/creating_nimas.html

on a wide scale by staff in local authorities and schools. At the present time it is a niche format, well-suited to Digital Audio Book production by RNIB for example, but not as suitable for widespread use in comparison to other more established formats and tools. The NIMAS and Daisy formats and tools are designed around the needs of the visually impaired and we believe that the standard itself, and the production and reading tools require further development before they might be suitable for other print-disabled groups.



Figure 10.11: DAISY books read with EasyReader

Accessibility

Daisy books are designed for visually impaired users with good language and understanding and are very accessible for this group, provided the correct type is obtained and the reader software can open it. The audio books are accessible for pupils with reading, understanding and physical difficulties, although for most of these pupils the Daisy format does not offer much more than a standard MP3 audio book that can be played on much cheaper and more readily available hardware.

Daisy is a published standard but accessibility of Daisy books varies depending on the player and on the software reader used. For example, a Daisy audio book can be played back on a PC using EasyReader software, but TextHelp's Read and Write Gold program, which has a Daisy reader, cannot play type 2 Daisy audio books. Read and Write Gold can read back Daisy computer books using synthetic speech, but cannot play back any recorded human voice.

Like other digital formats, Daisy books on computer vary in terms of accessibility depending on the actual file and the software used to display and read the book. In theory, the Daisy standard should help to ensure that books are correctly designed and structured, but in practice this does not seem to be happening. The US Bookshare site, for example, which offers 30,000 accessible Daisy and BRF (Braille) files, no longer accepts books donated in Daisy format because they can be unsatisfactory and difficult to rework – RTF, Word, Kurzweil, Ark (Open Book) and Wynn formats are required⁸⁰.

Control over the text size, spacing and colours of a Daisy book depends on the software used to read it. EasyReader can alter colours and size but the font itself

⁸⁰ <http://www.bookshare.org/web/Welcome.html>

cannot be altered and so it may or may not be suitable for pupils with dyslexia who prefer particular fonts. All functions can be operated with the keyboard as well as the mouse, so the books are reasonably accessible for pupils with physical difficulties. Since XHTML files can display graphics, Daisy books should be able to display symbol-supported text although we have not seen any examples. A switch user could use switches to scroll up and down and turn pages but there are no built-in switch and scanning options.

A pupil can add text and voice notes to a Daisy book on computer but they are not designed to be interactive: the format is not as suitable as Word, PDF, Clicker or Textease for creating worksheets or examination papers where the pupil has to type in answers to questions. This is significant disadvantage compared to these other more interactive formats.

DAISY is one of several possible formats for distributing digital curriculum resources. It is designed for visually impaired and blind people. DAISY books require special players and reading software. Formats such as PDF, Word, various eBook varieties and basic MP3 are cheaper and easier to produce and accessible to a larger number of pupils, using a greater range of devices, such as Pocket PC and PDA's, both Windows and Macintosh computers, and standard MP3 audio players. DAISY has a role, because a blind pupil may find a DAISY book more accessible than a standard MP3 audio file, for example, but other formats are better suited for other groups of children with additional support needs.

A significant number of school resources, such as worksheets, tests and examination papers, need to be interactive, and therefore accessible digital versions should enable pupils to type answers quickly and easily into the resource on screen. The DAISY format does not provide this capability, whereas other formats, such as PDF and Word, do. To provide accessible digital resources for *all* children with additional support needs in Scotland, not just those with a visual impairment, requires materials in more than format, suited to the child and also to the type of resource in question.

Kurzweil (KES)

Kurzweil 1000 and 3000 are programs designed specifically for converting paper and digital documents into formats that can be accessed by pupils with disabilities. Kurzweil 1000 is for visually impaired pupils, while Kurzweil 3000 is aimed at sighted pupils with reading difficulties. The programs are both very easy to use, particularly for scanning and converting textbooks into digital form. The main advantage of Kurzweil 3000 compared with other scanning and OCR programs is ease of use and that the scanned image appears almost exactly like the paper original. Most other scanning and OCR programs create Word, HTML or PDF files, and the software conversion process to generate these formats (especially into Word and HTML, less so with PDF) can often produce digital copies with untidy results.

The Kurzweil software to scan books is expensive (£725 for colour scanning; £500 for black and white) while the LearnStation version to read the scanned books costs £185 per computer. Kurzweil is available for Windows and Mac.

Several states in the U.S. have adopted the Kurzweil format as a standard for creating and distributing electronic resources and it is fairly popular in some parts

of Scotland (the City of Edinburgh, for example, bought scanning licences for all the secondary schools in the authority.)

The main disadvantage of Kurzweil is that a pupil requires Kurzweil software to open and read scanned KES files. Kurzweil can save scanned books in Word and other formats but all formatting and graphics are lost in the process. This means that most pupils will need copies of the Kurzweil reader software, which is relatively expensive, and that options for converting into other formats are limited. A supply system based on Kurzweil is therefore more expensive to implement, and less flexible, than, for example, a system for scanning and distribution based on Word or PDF formats.

Accessibility

Materials in KES format are reasonably accessible for many pupils because the program has text-to-speech and useful study tools. Pupils with physical disabilities can use Kurzweil to navigate digital books but there are no switch access features built in. There are few structural features in a Kurzweil file and Kurzweil 3000 is not suitable for blind users, although Kurzweil 1000 is.

Textease (TE)

Textease⁸¹ is a word processing and desktop publishing program designed specifically for education. It is part of a suite of tools that includes software for painting, drawing, making movies, and working with spreadsheets, databases, concept maps and logo-like programming. Textease files can use text, pictures, sound and video. Several local authorities in Scotland have site licences for Textease and have created large banks of resources in Textease format. Free resources are also available from the Softease web site.

The Easiteach⁸² interactive whiteboard resources from Research Machines are essentially Textease files. RM computers with Easiteach software are installed in many local authorities and the resources are used for whole class teaching. Pupils with additional support needs can have independent access on personal laptops or desktops to Easiteach resources .

Accessibility

Textease files are accessible to the majority of pupils with additional support needs. Textease resources can be magnified and re-sized, colours and fonts altered and the program has a built-in text-to-speech reader. Textease resources can be very interactive and stimulating for many pupils because of the multimedia features and because of the general ease of use and support tools (word and picture banks, text-to-speech etc). However, most resources require use of a mouse so they are not suitable for many pupils with physical difficulties, and few resources can be accessed by pupils with severe visual difficulties.

⁸¹ Textease, <http://www.softease.com/>

⁸² Easiteach, www.rm.com/easiteach



Figure 10.12: Textease Digital book made by primary pupils and an interactive English exercise