Accessibility and e-learning

An epicentre white paper

Visit us at www.epicentre.co.uk

Epicentre 52 Old Steine Brighton BN1 1NH United Kingdom t: +44 (0) 1273 728686 f: +44 (0) 1273 821567

Accessibility: a 'minorities' issue?

"The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect." Tim Berners-Lee

The Internet is the fastest adopted technology in history. It has given hundreds of millions of people knowledge, services and learning they would have found difficult or impossible to access by other means. And what is the primary reason for this phenomenal success? Why did it reach critical mass so much quicker than railways or electricity? The answer lies in its universal access - literally access at home, work, school, college, university, library, internet café, to any device with an Internet connection.

However, there's another, narrower sense of 'accessibility' to do, not with technical access, but the limitation of the user in terms of cognitive, visual, hearing or physical capability.

This type of accessibility is an issue easily caricatured simply as political correctness, applying to a tiny minority of the population. The truth is somewhat different. According to W3C, the governing body for the Worldwide Web, the proportion of people with disabilities can be up to 20% in some populations. A significant portion of those people with disabilities, in some countries as many as 8% to 10% of the overall population, can benefit from e-learning conforming to recommended standards.

In the UK an estimated one in five people of working age (6.9 million) are disabled. Over two million have visual impairment, nine million hearing loss, one million with learning difficulties and over seven million with literacy problems. Those with disabilities are also twice as likely to be unemployed.

In the US alone, there are 52 million people with cognitive,

visual, hearing and physical disabilities and the number is growing as people live longer.

What's more, we can also expect a higher proportion of disabled people to enter the workforce with an ageing workforce and skills shortages. Nobody is immune from the effects of ageing. So, eventually, accessibility affects us all.

E-learning, providing it is accessible, has the potential to open up fresh and innovative solutions to learners with disabilities. We may have found a good solution to a difficult problem.

Benefits of accessibility

An argument commonly used against those who campaign on behalf of greater accessibility is that the cost of making websites and e-learning products more accessible just doesn't justify the benefits. So what are these benefits?

Above and beyond the vital help it gives to people with disabilities, increasing the accessibility of your online communications could:

- Increase sales (if you have something to sell)
- Increase audience reach
- Improve search engine listings
- Reduce loads on your server
- Reduce loads on server bandwidth
- Reduce site maintenance costs
- Reduce the potential of costly legal liabilities

So, there could be a direct payback to taking accessibility standards on board.

Above all, one should consider the great distress caused to those whose sensory, physical and cognitive limitations restrict their abilities to do what they want on the web or with e-learning when accessibility is ignored. These are often people for whom learning and training are essential to increase their opportunities for employment and further their quality of life.

Let us not forget that learning difficulties arguably affect many more people than visual, hearing or physical disabilities. Teachers in schools are likely to be dealing with many more special needs students than students with obvious disabilities. One of the great benefits of self-paced web content and e-learning is the freedom from teacher-paced delivery. The fact that you can go at your own pace, no matter how slow, is a fantastic benefit, levelling the playing field for all web users and learners. This is not, of course, to dilute the barriers faced by those with visual, hearing or physical disabilities.

Barriers to accessibility

Some of the common barriers that people with physical, visual, hearing and cognitive disabilities may encounter in e-learning include:

- No alternative text for images
- No alternative text for graphics hot-spots
- Uncaptioned audio or undescribed video
- Lack of alternatives for users who cannot use a mouse
- Tables that are difficult to decipher when read in lines
- Poor colour contrast

What is clear is that most of the legislation and guidelines reference the official Web Accessibility Initiative Standard (WAI) from the World Wide Web Consortium (W3C), with direct references to specific versioned documents. But guidelines and legislation are not enough in themselves. This is only one approach to solving the problem. The Internet and e-learning industry must recognise that while lawyers may have a role in extreme cases, a voluntary response is what is needed.

The conclusion is simple; accessibility is now a major issue on the web and in e-learning, an issue to which we must all respond.

Pragmatic accessibility

Doing nothing is not an option. This leaves three major responses on accessibility in websites and e-learning:

- A prioritised approach
- A single version for all
- Multiple versions

There are some very strong arguments for a pragmatic and realistic approach to accessibility as opposed to idealism. The 'some versus all' argument needs to be tackled head on, as does the argument between single accessible versions of web pages or e-learning and those who see different versions as the solution - the 'single versus multiple' argument.

Some versus all

As Jakob Nielsen has shown in his study, Disabled Accessibility: The Pragmatic Approach, the problems surrounding accessibility should come as no surprise. *"After all, countless usability studies of websites and intranets have documented severe usability problems, low success rates and suboptimal user performance, even when testing users with no disabilities."* In general, improving accessibility improves usability, which in turn improves performance, leading to cost benefits and savings.

Having said all this, major issues do exist surrounding the degree to which accessibility should or can be implemented within the real constraints of time, cost, skills and resources. The value of Jakob Nielsen's prioritised approach is that he has undertaken real accessibility trials of 19 websites with users with several different types

of disabilities on a range of assistive technologies. These include blind users using screen readers, blind users using Braille readers, vision impaired users using screen magnifiers and motor impaired users. A total of 104 users participated in the usability studies - 84 users with disabilities and 20 non-disabled users as a control group. This is a solid piece of work with some practical advice based on the real needs of people with disabilities, rather than armchair commentary.

His conclusions could be said to run against the grain, in that he recommends a pragmatic, gradual approach to making existing websites accessible. His advice is to get your top priorities fixed first through a set of prioritised design rules. There are 17 high priority rules (follow these or many users will not be able to use the site at all), 33 medium priority rules: (violating these rules will make it difficult, but not impossible to use the site) and 16 lower priority rules (that do improve accessibility but can be violated without hurting users too much). His argument is that pushing for too much too soon will create overload and in reality, if the choice is between 100% compliance and nothing, many will do nothing. This makes a great deal of sense. On the other hand, if legislation exists then being a pragmatist is no justification for breaking the law.

Unfortunately, accessibility, like most 'standards', is more of an umbrella term referring to a variety of different guidelines issued by a host of organisations. So to claim a programme is 'accessible' is perhaps meaningless. We need to avoid blanket terms like, "the programme will be accessible." How could anyone ever be able to prove this? So think from the standpoint of what evidence will demonstrate that the proposed requirements have been met.

Websites tend to be less of an issue in as much as they are online only environments. So server-side scripting can be used, which greatly facilitates making the content conformant with accessibility guidelines. Of course, this doesn't happen by

default and careful attention needs to be given to accessibility, but it is much easier to apply.

E-learning, even when being mainly delivered as a 'website', sometimes has an offline requirement. In other words, there are multiple delivery paths, often including the whole programme running from CD. In this situation, client-side scripting is more or less inevitable.

In any case, taking a pragmatic approach in the absence of specific requirements, one can make every effort to make all programmes accessible:

- Use ALT text to describe all non textual static elements, such as graphics, icons and graphic text (e.g. titles)
- Provide, where possible, a text alternative to all non-textual 'moving' elements, such as audio, video and animation
- Ensure any hot (clickable) elements can be controlled via the keyboard, e.g. Tab cycles through active buttons and Enter acts as a mouse click
- Punctuate to meet the requirements of screen readers, e.g. use full stops at the end of all bullet points
- Avoid 'difficult' screen types, such as drag and drop, unless there is a good instructional justification to include them

Single versus multiple

Single versions of web pages accessible to all, some argue, will result in a reduction in quality of the content so that everyone loses. Accessible material may become less effective or even more inaccessible if too much emphasis is put on 100% technical compliance and not enough attention on getting the greatest amount of quality information and learning to the greatest number of people. It is easy to add ALT texts to graphics; however, the diversity of devices from small PDAs to large monitors may mean designing for client specific environments.

Multiple versions (which usually means a text alternative version) may be more practical,

not only for optimised reading by text to voice assistive technology, but also for the many handheld devices that have low bandwidth and text displays. Multiple versions may actually result in more targeted and better content for those with disabilities. The reason is that these versions will be specifically designed for these groups rather than some compromise that reduces effectiveness for all.

Pragmatism suggests that, in cases where e-learning must meet all WAI guidelines, the solution is to make two versions of the programme - one conforming as far as technically possible to the guidelines, and the other using different stylesheets to produce a fully accessible, rich text version.

It is debatable whether it is possible to follow accessibility guidelines in their entirety and variety, without severely compromising the end product. It is of course possible to cherry pick those that are relatively simple to adhere to and satisfy these. But if one needs to follow all guidelines, then the outcome will inevitably be flat pages with redundant graphics (if a picture tells a thousand words, then we will need a lot of ALT text!) and unconditional branching. Unfortunately, this might only be obvious as the outcome after much expensive development effort, but a requirement to conform to all guidelines might make this inevitable.

The problem with the concept of cherry picking guidelines, is that these will be the subjective decisions of a few people. Once other people are involved, including users, they might disagree with these decisions and initiate a long and costly re-engineering process to add adherence to other guidelines.

Conclusion

As the web matures and new standards emerge along with the universal spread of marked up XML, then single source, database driven solutions will satisfy the needs of multiple devices, multiple types of disability in multiple languages.

Until then, individual projects need to be pragmatic in deciding how much they can cope with and retain the ability to choose between single and multiple version solutions.

The effectiveness argument is also crucial in the case of e-learning, where higher levels of interaction, assessment, detailed graphics and media rich content, all designed to improve learning, may be difficult, impossible or very costly to design or redesign to accessibility standards. The argument for multiple versions may be stronger in e-learning than they are in web design in general.

Finally, a website or piece of e-learning has objectives beyond just accessibility alone. Accessibility is a means to an end, not an end in itself. It must provide access to usable content and services. Simple technical compliance on accessibility goes some way towards solving the problem, but, as Nielsen says, "accessibility is necessary, but not sufficient" for usability and success. Approved sites and e-learning may still be difficult to use for people with disabilities. An orchestrated effort by buyers, vendors, designers, governments and expert groups must encourage, and not just enforce, good practice.

Defining disabilities

To understand accessibility issues, one must understand the range of disabilities that exist, along with the assistive technologies that help learners with visual, hearing, physical and cognitive disabilities.

There is no absolute classification for disabilities and strict medical terminology is rightly avoided. But the general categories of visual, hearing, physical and cognitive disabilities cover most of what is relevant. Note that these can also occur in combinations.

Visual disabilities

Blindness involves a serious, sometimes uncorrectable loss of vision in both eyes. This means that some people who are legally blind can have residual vision. This covers a huge range of capabilities, from the simple recognition of light sources to the ability to view things that are magnified. Access by people who are blind is usually accomplished using special screen reading software to access and read the contents of the screen, which is then sent to a text to speech synthesizer or refreshable Braille display. Some use text based browsers such as Lynx.

Partially sighted people have low vision. This can be poor acuity (vision that is not sharp), tunnel vision (seeing only the centre of the visual field), central field loss (seeing only the periphery of the visual field) and clouded vision. Partially sighted people use extra large monitors and/or increase the size of system fonts and images. Others use screen magnifiers or screen enhancement software. Some individuals use specific combinations of high contrast text and background colours, or choose typefaces that are particularly useful for their vision requirements.

Colour blindness is a lack of sensitivity to colours such as red and green, or between yellow and blue. At its most extreme, colour blindness means the inability to perceive any colour. People with colour blindness sometimes use their own style sheets to override the font and background colour choices of the author.

Hearing disabilities

Deafness involves a serious, sometimes uncorrectable, loss of hearing in both ears. Some deaf individuals' first language is sign language and they may or may not read or speak another language fluently. Many deaf people rely on captions for audio and video content. Hard of hearing is a mild to moderate hearing impairment. People who are hard of hearing may need the amplification of audio, with control over the volume. Many will also use captions for audio and video content. Coupling the audio directly to their hearing aids is also useful. Note that these are hardware considerations and can be satisfied with systems having volume controls and headphone or audio sockets.

Physical disabilities

Physical disabilities, sometimes called motor disabilities, can include involuntary movements, lack of co-ordination, paralysis, limited sensation, joint problems, pain or missing limbs. Problems with hands and arms particularly impede access but other parts of the body can also cause problems. This type of disability doesn't necessarily affect the user's ability to read, see or hear information from the screen, but does impede input through the keyboard or mouse. People with motor disabilities affecting the hands or arms may use assistive technologies such as a specialised mouse, a keyboard with a layout of keys that matches their range of hand motion, a pointing device such as a head-mouse, head-pointer or mouth-stick, voice recognition software, an eye-gaze system or other technologies to access and interact with the learning.

Cognitive disabilities

Dyslexia or dyscalculia (sometimes called 'learning disabilities' in the US) can limit learning as the learner may have difficulty processing text or images when read, or the spoken word, or numbers when read or heard. Delivering content in multiple formats as text, images and audio can help this type of learning difficulty.

Attention deficit disorder can result in poor focus or concentration. Distractions such as animations may not be suitable for learners with this problem.

People with learning disabilities may learn more slowly, or have difficulty understanding complex concepts. They may need more graphics to enhance understanding, or benefit from simpler language.

Memory disorders can affect short term and long term memory. People with memory impairments may need a consistent navigational structure throughout the site and reinforcement techniques.

People with mental health disabilities may have difficulty focusing on learning, or difficulty with blurred vision or hand tremors due to side effects from medications.

Seizure disorders can be triggered by visual flickering or audio signals at a certain frequency. People with seizure disorders may need to turn off animations, blinking text, or certain frequencies of audio.

Assistive technologies

People with disabilities use assistive technologies to help them overcome their difficulties. In the case of computers and e-learning, this covers a range of hardware and software assists. This is by no means a definitive list, but it covers the main categories of assistive technology that you need to be aware of in order to plan for accessibility.

Braille is read by the fingertips and uses six to eight raised dots in patterns to represent letters and numbers. Dynamic or refreshable Braille uses a mechanical display where pins are raised and lowered dynamically

to allow any Braille characters to be read. Users who are deaf-blind commonly use refreshable Braille.

Screen readers are used by the blind, or people with vision impairments or severe reading difficulties to get screen text converted to speech or refreshable Braille. People who are used to using screen readers (such as JAWS) get used to listening at very high speed.

Magnifiers help learners with low vision. They automatically follow the cursor to automatically magnify that part of the screen. This has the side effect of making the rest of the document smaller. The colour and look of screen text can also be changed.

Text browsers such as Lynx are used by the blind, or those with vision impairment or severe reading difficulties. They avoid the loading of images, leaving only text which can be converted to speech or refreshable Braille.

Voice recognition is a solution if you have problems with typing or using your hands or arms. Voice recognition software can allow you to do most of what you require through voice commands or speech, which is converted to commands or text.

Alternative keyboards are available with very small keys, for those with limited range of motion, or very large keys for those with little motion control. On-screen keyboards appear on the monitor and can be used with a mouse, avoiding the use of a physical keyboard.

Single switches help those with severely limited movement. The switches are used to move through options then choose these options one by one. They are often used with on-screen keyboards and word predictive software. This is the technology that the physicist Stephen Hawking uses along with speech synthesis software. Sip-and-puff switches also allow computer control using only the user's inhalation and exhalation.

Scanning software, for users with physical or cognitive disabilities, highlights or announces selection choices one at a time giving the learner time to make choices. The user hits a switch when the choice is highlighted or announced.

W3C web accessibility initiative standards (WAI)

The starting point for the great majority of guidelines and legislation in accessibility is the official Web Accessibility Initiative Standard (WAI) from the World Wide Web Consortium (W3C).

National laws and policies on accessibility are mushrooming in countries such as Australia, Canada, Denmark, European Union, France, Ireland, Italy, Japan, Portugal, United Kingdom and the US. Most of this legislation directly references the official Web Accessibility Initiative Standard (WAI), specifying the documents and the version number. Others have written their own versions or combined these with general usability or best practice guidelines. An excellent and current source for legislation and guidelines in different countries can be found at www.w3.org/WAI/.

The new WAI WCAG version 2.0 has been released. We recommend that it is adopted for all e-learning programmes. We make this recommendation because version 2.0 is:

- Based on measurable success criteria, for example the minimum contrast between foreground and background is now spelt out (contrast ratio of at least 5:1)
- Updated to reflect the current technological environment (a lot has changed since version 1.0 was released in 1999!), for instance the checkpoint about not using scripts has gone since it is no longer relevant
- Based on principles rather than checkpoints in other words aimed at providing clear benefits to users

The four principles of version 2.0 are:

- Perceivable: Information and user interface components must be presentable to users in ways they can perceive
- Operable: User interface components and navigation must be operable
- Understandable: Information and the operation of user interface must be understandable
- Robust: Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies

Each of these has a number of specific guidelines (12 in all). These correspond to the old version 1.0 guidelines, but are of course quite different. To help meet the version 2.0 guidelines, each has one or more success criteria as well as a number of helpful and practical techniques. The WAI website fully documents all the detail.

Legislation and guidelines (US)

E-learning is indirectly involved with recent legislation, guidelines and recommendations by virtue of being software or web based material. The legislation is not specifically directed at e-learning, but e-learning software and content certainly comes under the legislation.

Section 508

In 1998, the US government enacted Section 508. This legislation requires Federal agencies to make their electronic and information technology accessible to people with disabilities. This was based on the democratic principle that inaccessible technology interferes with an individual's ability to obtain and use information quickly and easily. The law applies to all Federal agencies when they develop, procure, maintain, or use electronic and information technology. Under Section 508, agencies must give disabled employees and members of the public access to information that is comparable to the access available to others. The standards apply to Federal websites but not to private sector websites.

Section 508 applies to various types of technologies, including:

- Software applications and operating systems
- Web based information or applications
- Telecommunication products
- Video and multimedia
- Self contained, closed products (e.g. information kiosks, calculators and fax machines)
- Desktop and portable computers

In e-learning, the first two are of most relevance.

Software applications and operating systems

Most of the specifications for software pertain to usability for people with vision impairments. For example, one provision requires alternative keyboard navigation, which is essential for people with vision impairments who cannot rely on pointing devices, such as a mouse. Other provisions address animated displays, colour and contrast settings, flash rate and electronic forms, among others.

Web based intranet and Internet information and applications

The criteria for web based technology and information are based on access guidelines developed by the Web Accessibility Initiative of the World Wide Web Consortium. Many of these provisions ensure access for people with vision impairments who rely on various assistive products to access computer based information, such as screen readers.

Certain conventions, such as verbal tags or identification of graphics and format devices, like frames, are necessary so that these devices can 'read' them for the user in a sensible way. The standards do not prohibit the use of website graphics or animation. Instead, the standards aim to ensure that such information is also available in an accessible format. Generally, this means use of text labels or descriptors for graphics and certain format elements. (HTML code already provides an 'Alt Text' tag for graphics, which can serve as a verbal descriptor for graphics.) This section also addresses the usability of multimedia presentations, image maps, style sheets, scripting languages, applets, plugins and electronic forms.

Information, documentation and support

The standards also address access to all information, documentation and support provided to end users. This includes user guides, installation guides for end user installable devices, and

customer support and technical support communications. Such information must be available in alternate formats upon request at no additional charge. Alternate formats or methods of communication can include Braille, cassette recordings, large print, electronic text, Internet postings, TTY access, and captioning and audio description for video materials.

For more information and checklists on Section 508 see www.section508.gov

legislation and guidelines (UK)

Unlike the US, the UK has yet to take detailed legislative action on accessibility, but the basis for such legislation already exists in the Disability Discrimination Act.

In education, the Special Educational Needs and Disability Act and a code of practice by the QAA are targeted at educational content and provision. Published Government guidelines promoting accessible web design are also available and groups such as the RNIB (Royal National Institute for the Blind) have vigorous campaigns on accessibility. The RNIB recommends use of the WAI web content accessibility guidelines.

Disability Discrimination Act & Special Educational Needs and Disability Act

E-learning, in the UK, is seen as a service and therefore covered by the Disability Discrimination Act (1995). Education was originally excluded from this Act, but two additions aimed at education are now relevant:

- The Special Educational Needs and Disability Act 2001 (SENDA) (now seen as Part 4 of the DDA)
- A code of practice by the Quality Assurance Agency (QAA)

The Disability Discrimination Act 1995 defines a disabled person as someone with "*a physical or mental impairment which has a substantial and long term adverse effect on his ability to carry out normal day to day activities.*" (DRC, 1999)

A service provider can be seen to discriminate against a disabled

person in two ways: By treating him or her less favourably than other customers because of their disability, or by not making reasonable adjustments to the way services are delivered, so that disabled people can use them (DRC, 1999).

Quality Assurance Agency (QAA) Code of practice

The QAA has developed a code of practice for students with disabilities which aims to, *"assist institutions in ensuring that students with disabilities have access to a learning experience equal to that of their peers."* This code of practice recognises that disabled students are an integral part of the academic community. It takes as its starting point the premise that accessible and appropriate provision is not 'additional', but a core element of the overall service which an institution makes available. As such, the quality of the learning opportunities on offer to disabled students in higher education institutions needs to be assured in the same way as any other provision.

RNIB campaign for good web design

The Royal National Institute for the Blind states that people with disabilities have a moral (and in some cases a legal) right to be able to use websites. It represents over 2 million blind and partially sighted people in the UK and campaigns for:

- Organisations to recognise that the discrimination created through inaccessible websites is unacceptable and unnecessary
- Organisations to take the necessary steps to improve the design of their online services
- Web designers to take responsibility to ensure everyone, regardless of ability or disability, can read their designs
- Organisations who have websites, or who are planning to launch them, to recognise the needs of visually impaired customers. Failing to do so conflicts with the Disability Discrimination Act

- Organisations to write 'a requirement for accessibility' into design briefs when putting a contract for their website design out to tender
- Blind and partially sighted people to contact organisations whose websites are inaccessible and raise the issue of accessibility directly

Guidelines for UK Government websites

The Central Office of Information (COI) works to help improve government communications in digital media. They recommend that public sector websites must be designed with the end user in mind, in a style that is readable to as wide a section of users as possible. The aim is to be inclusive, bearing in mind the wide range of users' circumstances and technical knowledge. They may be using a browser that does not allow frames, or they may use access technology that reads the contents of the site and relays it in audio format. They may be unable to view active content and they may have their screen set to a lower or higher resolution to that in which the site was designed. It is essential that websites are designed to be open and not to disenfranchise sectors of the population.

Note that these are guidelines, not laws. However, it is worth looking at them in full, as they cover a range of design issues including accessibility. There is direct reference to compliance with the Disability Discrimination Act mentioned above.

Below is an extract.

1. The minimum standard of accessibility for all public sector websites is Level Double-A of the W3C Web Content Accessibility Guidelines. All new websites must conform to these guidelines from the point of publication.

2. Websites owned by central Government departments must be Double-A conformant by December 2009. This includes websites due to converge on Directgov or BusinessLink, unless convergence is scheduled before this date.

3. Websites owned by central Government executive agencies and non-departmental public bodies must conform by March 2011.

4. Government websites owners are reminded to follow the conditions of use for a .gov.uk name (Registering .gov.uk domain names (TG114)). Websites which fail to meet the .gov.uk accessibility requirements may be at risk of having their domain name withdrawn.

5. Compliance with the Web Content Accessibility Guidelines is acceptable at Level Double-A of version 1.0 or the equivalent level in version 2.0. Future policy and timetables for implementation will align with European Commission recommendations on the adoption of WCAG 2.0. Planned future updates to this guidance will include details of the specific conformance requirements for version 2.0.

http://www.coi.gov.uk/guidance.php?page=131

Text only versions

Ideally, a website should be both accessible and useable. Some websites rely on a non graphic, text-only version to make their sites accessible. But a text-only version may not be useable if, for example, it contains too many links or is confusing when presented through assistive technology. It is essential to ensure that content is complete and up to date.

Rather than invest in a text-only version that is not useable, it may be better to clarify the navigation and text to improve usability as well. It is preferable to make the graphic version of your website more usable, taking steps such as reducing numbers of links and clearly describing options and navigation.

Where you are using multimedia or plugins, such as Macromedia's Flash, it is preferable that the user accesses (as the default) a usable website with an option to choose a multimedia alternative rather than being delivered the multimedia version with an option to choose the alternative.

IMS accessibility guidelines

Accessibility exists in several layers for the e-learner; hosting, LMS, surface content and deep content. Simply tagging graphics and audio is not enough. Instructional designers need to think more carefully about sentence length, the use of visual cues that are not referenced and the difficulties with interactions such as drag and drop exercises. Accessibility must be integrated into the design, not left as an afterthought.

Another worrying finding is that simply meeting the guidelines does not guarantee good, accessible learning.

A Disability Rights Commission study found that up to 45% of problems were separate from meeting the WAI guidelines. They were real problems that could only have been detected by real user testing. In any case, less than 19% of the websites studied even attempted to comply with WAI standards.

Another rich source of information on accessibility and e-learning are the IMS Accessibility Guidelines. This is pretty detailed in terms of issues and solutions. What follows is an edited version concentrating on the mainstream issues.

The IMS Accessibility Guidelines have been developed by the IMS Accessibility Working Group specifically for the learning community. They address 6 principles for producing accessible software applications and content for online distributed learning. These principles primarily address accessibility for people who have sensory or mobility

disabilities and, to a lesser extent, on the wide array of accessibility issues faced by people with cognitive disabilities. Many of these principles will also be beneficial to users with cognitive disabilities, such as a learning disability. However, comprehensive solutions for these users goes beyond the scope of this document. Attention should be given to implementing these practices from the beginning of the design/development process, since retrofitting a product or content for accessibility is almost always significantly more labour intensive and costly than incorporating it from the start.

The 6 principles:

1. Allow for customisation based on user preference
2. Provide equivalent access to auditory and visual content based on user preference
3. Provide compatibility with assistive technologies and complete keyboard access
4. Provide context and orientation information
5. Follow IMS specifications and other relevant specifications, standards and/or guidelines
6. Consider the Use of XML (Extensible Markup Language)

Each is explored below.

Allow for customisation based on user preference

Allowing for versatility in the way information is presented makes applications, software and content more fully accessible to a wider variety of users. Some examples of items that should be customisable by the users include changes to the display and characteristics of elements and features, such as:

- Font, font style, font colour and font size
- Cursor size, style and blink rate
- Size of text and images, including video
- Screen layout, colours and backgrounds

- Timing of events
- Keyboard settings

Provide equivalent access to auditory and visual content based on user preference

For users who are deaf or hearing impaired, equivalent access to all auditory aspects of learning technologies and learning content should be provided. Accessibility solutions include:

- Captioning of any auditory content
- Providing a text transcript of auditory content

For users who are blind or visually impaired, equivalent access to all visual aspects of learning technologies and learning content should be provided. Accessibility solutions include:

- Adding text description (alternative text or ALT text) for all static images (pictures, logos, charts, links, other graphics), which can then be read by a screen reader
- Utilising 'longdesc' attribute for images that require more lengthy descriptions
- Providing audio description tracks for multimedia, describing visual aspects of the content

Provide compatibility with assistive technologies and complete keyboard access

Applications, software and content must be compatible with all types of assistive technologies, including screen readers, screen magnifiers, adaptive keyboards, voice recognition software and single switches. Provide keyboard access to all elements of an application or content, including menus, help directories, toolbars and dialog boxes, and do not assume that a user can use a mouse.

Provide context and orientation information

Providing context and orientation information is vital to making applications and software more usable. Context

and orientation information can be provided in the following ways:

- Inform users how to navigate, where to find menu information and how long a page is
- Provide a way for users to skip standard page headers and navigation links, so that users who are already familiar with the page layout can skip directly to the primary content
- Maintain a consistent layout of pages so users do not have to keep familiarising themselves with a different layout
- Provide alerts/text warning if a new browser window will be opened automatically

Follow IMS specifications and other relevant specifications, standards and/or guidelines

Following relevant specifications and guidelines improves accessibility in two ways. Most obviously, guidelines that provide information on how to implement accessibility offer useful techniques and suggestions. But because accessibility often relies on interoperability between the learning applications, software, or content and the user's assistive technology, following other relevant industry specifications is likely to improve access by ensuring they behave as the assistive technology expects them to behave.

Consider the use of XML (Extensible Markup Language)

As the popularity of the web and the complexity of what is presented over the web have grown, the limitations in presentation via HTML have become more complex. XML, or Extensible Markup Language was developed by the XML Working Group of the W3C, and the W3C Recommendation for XML 1.0 was published in February 1998 as the next generation markup language. XML differs from other markup languages, such as HTML

(Hypertext Markup Language) or HTML's predecessor SGML (Standard Generalized Markup Language) as it is much less complicated than SGML and much more flexible than HTML.

A public working draft of the WC3 XML Accessibility Guidelines is available at: http://www.w3.org/TR/xmlgl

Conclusion

E-learning may, in the long run, prove to be the most significant educational advance for those with disabilities. This is a bold claim, but backed up by the fact that the Internet has already provided access, often directly into people's homes. The web, with assistive technology, has opened up unfathomable opportunities for those with disabilities.

The simple fact that one can go at one's own pace is e-learning's gift to those who may find that they have difficulties, for one reason or another, in keeping up. Those with dyslexia, for example, may benefit from the addition of other media and the ability to go at their own pace, options that are often not available in the classroom. Different media types open up opportunities. Sound can be used for those with visual impairment. Text and images can be used for those with hearing impairment. Graphics, sound, animation and video can be used for those with dyslexia.

We may all end up gaining from this initiative if increasing accessibility also increases usability. The ability to resize text and increase image size will be a boon to all of us as we age. Access to different media types will enhance learning for all of us. However, simply adhering to guidelines is not enough. Buyers, developers and learners must all recognise that this is a MAJORITY, not a minority issue. Guidelines and laws are important, but it is people who make the difference.

Resources

The World Wide Web is full of information about disabilities. The trick is to find the level of information relevant to your needs.

General accessibility resources

www.w3.org

The World Wide Web Consortium's (W3C) commitment to lead the web to its full potential includes promoting a high degree of usability for people with disabilities. W3C, in coordination with organisations around the world, pursues accessibility on the web through five primary areas of work, technology, guidelines, tools, education and outreach, and research and development.

www.useit.com

Jakob Nielsen's article on Pragmatics, Get the Top Priorities Fixed First, along with a review of W3C Web Accessibility Standards. A key empirical study on accessibility and the web using 104 users - 84 with disabilities and 20 non disabled, who served as a control group.

US accessibility resources

www.section508.gov

Section 508 requires that Federal agencies' electronic and information technology is accessible to people with disabilities. The Center for Information Technology Accommodation (CITA), in the US General Services Administration's Office of Government Wide Policy, supports its implementation.

www.cast.org

CAST is an educational, not for profit organisation that uses technology to expand opportunities for all people, including those with disabilities. It expands educational opportunities for individuals with disabilities through its Universal Design for Learning.

http://ncam.wgbh.org/

The CPB/WGBH National Center for Accessible Media (NCAM) is a research and development facility dedicated to the issues of media and information technology for people with disabilities in their homes, schools, workplaces and communities. Good resources and tools.

UK accessibility resources

www.rnib.org.uk

The Royal National Institute for the Blind has launched a campaign to increase accessibility for the blind. This site outlines the aims of the campaign.

http://jisc.cetis.ac.uk/

JISC CETIS represents UK higher education and further education institutions on international learning technology standards initiatives.

http://www.coi.gov.uk/

Here you can find Guidelines for UK Government Websites. They are relevant to all public sector organisations that use the Internet to publish information and provide services to citizens and businesses. Their purpose is to promote excellence in public sector sites, through good management and good design.

http://www.opsi.gov.uk/acts/acts1995/ukpga_19950050_en_1

The Disability Discrimination Act (DDA), passed in 1995, introduced new measures aimed at ending the discrimination that many disabled people face. It protects disabled people in the areas of employment, access to goods, facilities and services, and the management, purchase or rental of land or property.

Commercial sources

www.usablenet.com

UsableNet is a commercial provider offering expertise in the form of tools that automate website usability and accessibility testing. Its software and online services enable web developers to test and fix websites to comply with industry standards, including the W3C 'Priority 1' and US Section 508 accessibility guidelines.

http://www.adobe.com/

Macromedia claims to be committed to the development, design and testing of products to ensure conformity with Section 508 guidelines. They also support developers of assistive technologies and the implementation of international standards to guide developers of accessible sites, including the WCA Guidelines offered by the World Wide Web Consortium (W3C).

Other epic e-learning white papers

E-learning benefits

- E-learning: Return on investment
- Organisational benefits

Subjects

- Induction and e-learning
- Compliance and e-learning
- Softskills and e-learning
- Healthcare and e-learning
- E-learning for IT systems

Learning and design

- Blended learning
- Blended learning in practice
- Use of media in e-learning
- Learning design for e-learning
- Usability in e-learning
- Localisation and e-learning
- Build, Buy or Both?
- Learner Centred Design

Learning

- Assessment and e-learning
- The psychology of e-learning
- Motivation in e-learning
- Pedagogy and e-learning
- Informal learning
- Personalisation and e-learning

Innovation

- Simulations and e-learning
- Blogs
- Web 2.0

Delivery

- Change management and e-learning
- E-tutoring

Technology

- Open Source and e-learning
- Reusable learning objects
- Testing for e-learning

Standards

- Standards in e-learning
- Accessibility and e-learning

To order white papers, please email:

contactenquiries@epic.co.uk or telephone +44 (0) 1273 728686.

To be notified of new white papers, and get the freshest thinking in e-learning, sign up for the regular Epic e-newsletter at www.epic.co.uk.