

Digital Document Access: Standards, Guidelines And Usability

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ABSTRACT

Most of us use standards and guidelines for creating accessible HTML based content. The commonly used guidelines are those set out by the World Wide Web Consortium (W3C). There are emerging guidelines for document structure, Flash applications, Adobe PDF and more. What happens when standards and guidelines are followed and documents are still “unreadable” and for many staff or students, “unusable”.

INTRODUCTION

Over the past few years, the most widely used guidelines for creating more accessible web based content have come from the W3C's (World Wide Web Consortium) Web Accessibility Initiative (<http://w3.org/wai>). These guidelines are often combined with legislation from federal, state or international jurisdictions. In the United States, they are combined with Bills 508 and 504 to create a more robust set of standards.

It has become clear that HTML content is not the only digital information that has barriers for those with disabilities. As part of a “normal” online course, one might find Adobe® PDF documents, Macromedia® Flash® applications, JavaScript applets, multimedia simulations, audio, video, synchronous communication, videoconferencing, complex images or eBook technology. The W3C is in the process of reviewing the original guidelines to include other forms of digital documents. Other organizations such as EduSpecs in Canada (<http://eduspecs.ic.gc.ca/index.htm>), IMS Global Consortium (<http://ncam.wgbh.org/salt/guidelines/>), the National Centre for Accessible Multimedia (<http://ncam.wgbh.org/projects/>), and the File Format Working Group out of CAST (Centre for Applied Special Technology) (<http://www.cast.org/ncac/index.cfm?i=3138>) are also looking at specific digital document formats to promote and provide access to people with disabilities.

The ability to provide digital access is now encouraging authors and document designers to return to more structured and usable documents. One of the interesting themes in the presentations at the 19th Annual Conference on Distance Learning and Online Teaching, in Madison Wisconsin (<http://www.uwex.edu/disted/conference>) was that now that web authors had used the guidelines and created more “technically correct” web pages, people are still unable to find information, make sense of what they do find and navigate many course web sites. Improving the technical construction of HTML based documents has not improved their usability by staff and students. The next step is in the design of the documents and an exploration of document usability.

This paper begins by identifying some of the standards and guidelines available to authors to create more technically enhanced documents. Several working groups and organizations, along with summaries of their work will be showcased. This paper will also look at some of the usability issues that face all learners. For most designers, finding the current standards and guidelines is half the battle. Once we begin understanding technical barriers and removing them, we can look at some of the usability issues that face all learners and faculty in every educational environment. A focus on universal design principles is incorporated throughout the paper.

EMERGING STANDARDS

When web based content first “came into it’s own” and was more available to everyone, it was thought that this would be a great tool for people with disabilities who for one reason or another were not able to gain access to merchandise, education, banking and information. It soon became apparent that this was not to be the case. Much of what was being put online was highly visual, involved blinking and moving parts and was not well thought out in terms of navigational structure. The W3C attempted to wade into this issue by creating guidelines for more accessible content through the Web Accessibility Initiative (<http://w3.org/wai>). Due to this initiative, and the work of other organizations, most of us are now aware of obstacles that can make HTML based content inaccessible for people with disabilities.

We are now at the stage of web development where we are exploring the separation of structure, formatting and content. Guiding principles for bringing these elements of a document back together are:

- Equivalent access rather than alternative

- Direct interaction with information rather than comparable (<http://ncam.wgbh.org/salt/guidelines/>)

By using some of the technology developed for people with disabilities, all students are assisted in the learning process. For example, a text based document for someone who is blind or visually disabled, has a learning disability, or a hearing impairment also assists students using palm devices or cell phone based browsers to access the same information. Being able to load one's own style sheet gives people without disabilities the option to view content in a more personal and customized manner. In order to do this, you need to find the resources, then hope they are written for the lay person. This is not always the case.

XML AND HTML

XML or "Extensible Markup Language" is proving itself a valuable tool in separating content, formatting and structure. XML provides a structure, or "schema" for pieces of information, pieces of text and general document layout. The IMS Global Consortium consisting of participants from all over the world, has developed schema for accessibility (<http://www.imsglobal.org/>). They have also developed guidelines for online course development (<http://ncam.wgbh.org/salt/guidelines/>). As a further demonstration of usability, individual schema designed for specific accessibility issues such as display, captioning or signing, have now been replaced by a more global designation of "access for all".

What is a schema? If we think of documents we use on a daily basis and how often we copy text from one document to another, from a slide presentation to a word processed document to a spreadsheet, we are already familiar with schemas. The "object" we are copying is the content and the shell or structure we place around that is similar to an XML schema. One schema could be a slide presentation, one a formal word processor document and another the spreadsheet. One piece of content, used in several different ways – presented in several different "wrappers".

We now begin to think of the possibilities for content: schema for different languages, Braille, eBooks, HTML documents, more traditional documents – one iteration to be revised and deployed across many platforms and flavours of presentation. Theoretically content can be made secure, can be tracked, and presented with a customized user interface.

The further customization occurs using the W3 C guidelines for content. This is the “formatting” piece of our equation for improved access to web based documents. Will the text be blue, the background white, will it be indented, what is the summary for the table, what is the header row? Any element that might be considered formatting would fall under these guidelines. For the beginner, there are QuickTips (<http://www.w3.org/WAI/References/QuickTips/>) to get you started. These are approximately ten basic steps for beginners to format elements of a basic web page. For those who want to identify specific checkpoints and techniques, there are the checkpoints and techniques (<http://www.w3.org/WAI/Resources/#te>) . This larger document has referenced and cross-referenced sample code and guidelines. You can recycle code and modify it for your own use. Using table coding as an example, it is sometimes easier to learn by having the code in front of you and then going through it dissecting as you go. As previously stated, the W3C is now exploring the addition of other file formats in these guidelines. Freedom Scientific has an HTML Challenge to guide “lay people” and designers through some of the HTML obstacles (http://www.freedomscientific.com/HTML_challenge/html_challenge.html).

Complex Images And Equations

If web pages, or any kind of digital document has images, then designers have to decide how to present the information in those images. Traditionally Alt Text has been used to provide brief summaries of images. Often designers need to think about the purpose of the image, is the image used as a link to something else? If so, which is more important, the image or the fact that it is a link?

Images should support surrounding text and not be placed in documents because “it needs a picture”. If the image is one that is complex there are several ways of describing them. Some people use a “d” link which is a link to the letter “d” beside the image and it links to a text file that further describes the image. One issue with this accepted approach is that when a screen reader user asks for a list of links on a page and more than one image is represented by “d” which image is which “d”? Generally more descriptive links are preferred by users. If we think of someone with a motor disability trying to target the small “d” we can also see some usability issues.

The LongDesc is an attribute in HTML which allows for a description of the image that is longer than Alt Text but not as long as a text file. If the image is very complex, or is a piece of art, then consider using the “A Picture is Worth 300 words” guidelines established in a joint project between the Dayton Art institute and Wright State University (<http://www.csun.edu/cod/conf/2001/proceedings/0031alonzo.htm>). These guidelines create an objective “image” of the artwork. The text should be no longer than

300 words and is usually a plain text file accompanying the graphic. In the case of complex images in courses, or artwork, instructors may not want to be so objective, choosing instead to guide the learner through the aspects of the image. These guidelines are a good place to start and can form a firm foundation for institutional standards.

Currently one of the most difficult elements of any course or web site is mathematical equations. Many word processors have equation editing tools which create images of equations which are not accessible for those using screen reading or text-to-speech software. MathML (<http://www.w3.org/Math/>) should help with this and allow equations to be coded just like any other HTML element. Until it is fully integrated into browsers and our web designers toolkit. The only alternative is to hand code the equations as Alt Text or as a separate text file associated with the equation object/image. As an example, one might write the following Alt Text for an equation image/object: x^2 over y times 5 divided by 3^2 .

Adobe PDF

With version 4.x of Adobe Acrobat®, Adobe Systems began looking at the ability to make accessible PDF documents. Because the intent of PDF includes retaining structural and formatting integrity as well as levels of security to prevent revisions to documents, this was a daunting task. Adobe Acrobat 5.x was the first in a line of products that allow PDF document designers to create more accessible and secure documents.

Adobe Acrobat uses tags or elements, which look similar to HTML tags we're all familiar with and are XML based. This is known as the logical document structure or tags root. A conversion tool built into Adobe Acrobat 6.0 Professional, converts documents created in their native program to a PDF file which contains content more accessible to those using screen readers and text-to-speech technology. In fact Adobe Reader 6.0 includes Read Out Loud which is a text-to-speech engine. It also includes the ability to customize the appearance of the text in documents.

Adobe has made progress toward improved accessibility for scanned documents. Authors can use the built in Paper Capture® tool in Adobe Acrobat 6.0 Professional to create a PDF document from an image-only file, then perform OCR (Optical Character Recognition) to create a PDF document that can then be tagged for accessibility. For publishing houses or institutions requiring batch scanning, Adobe Acrobat Capture® 3.0 and the Adobe Capture Agent® Pack provides the ability to create accessible PDF documents as well as accessible forms. The Adobe PDF Forms Agent®, which is part of

the Adobe Capture Tag Agent Pack, is a stand-alone tool that can also be used in combination with Adobe Acrobat 6.0 Professional to create accessible forms.

Freedom Scientific® has a workshop on accessible PDF and accessible HTML from the perspective of a screen reader user. Information can be found at: (http://www.freedomscientific.com/fs_products/training_htmlPDFjaws.asp). You can also find information at <http://access.adobe.com> or the Karlen Communications web site (<http://www.iprimus.ca/~martha/table.htm>).

e-Book Technology

Library access is critical to the online learner and instructor. We've looked at PDF, but there are other digital document formats that are gaining popularity. One of these is eBook technology. Instructors are finding it easy to consolidate course content into one eBook for students which makes the course more portable. If you have an eBook reader that you can access, that is.

Most desktop versions of eBook readers have some form of customization for text display and maybe a text-to-speech engine, but what happens when you take that eBook reader and put it on a palm device, on a cell phone, or on a stand alone eBook reader? All of a sudden any kind of minimal access through a traditional desktop software interface is lost. For those who depend on screen reading technology, the inherent software customization is not enough to provide feedback on menu items, dialog boxes or error message boxes.

The File Format working group out of CAST (<http://www.cast.org/ncac/index.cfm?i=3138>) is establishing standards and guidelines for eBook access. Currently there are three formats under consideration: .lit from Microsoft®, .pdf from Adobe and the Daisy format (Digital Audio Information System). Daisy is a file format developed by the daisy Consortium (<http://www.daisy.org/>) to replace traditional tape based talking books with digital talking books. New Daisy technology for the software version of the product allows the reader to gain access to text as well as full audio of a book. The portable Daisy reader looks much like a CD player and can also play music CD's and MP3 files. The ability to play MP3 may seem superfluous however, for those students or faculty with learning disabilities or who are blind or visually disabled, scanning in text and saving it as an MP3 file is part of the emergent OCR/scanning technology (Optical Character Recognition). It is becoming an essential tool which allows portability of information.

The File Format Working Group has already decided on an open source format as a standard for elementary and secondary schools in the United States. Once a standard for college, university and mainstream libraries is established, accessibility to digital library content may improve.

One of the current issues with the Daisy format is that there is no mechanism for the average instructor or institution to create Daisy formatted material. Most of the software to create Daisy format is proprietary or cost prohibitive. The other two formats, Adobe PDF or Microsoft LIT, can be created with little or no financial investment in additional software. For Adobe PDF, Adobe systems has resources on their web site to create accessible eBooks. The financial investment is for Adobe Acrobat 6.0 Professional to create the PDF based eBooks. For instructors using Microsoft LIT format, there is a free plug-in that can be downloaded from the Microsoft web site. (Although this plug-in can't create sophisticated eBooks, it can convert basic Microsoft Word® documents into eReader or LIT format.)

Flash Applications

With the development of macromedia flash MX came the possibility to create more accessible Flash applications. One of the reasons Flash is popular is that similar to the use of PDF – things stay where you put them. Prior to the ability to create accessible Flash applications, people using text-to-speech technology, screen magnification or screen reading technology could not access any information in a Flash application. Imagine going to a university library site and hearing “blank, blank” instead of the navigational information and general library information other students see.

For those familiar with Flash, the scripting is easy to accomplish. For those learning Flash, the ability to create more usable and accessible applications will become an essential tool in the educational market. Think of a Flash interface in terms of a natural tab order of items in a navigational system instead of pressing the Tab key and going to the top item, then the middle item, back toward the top, down to the bottom, and so forth. Good structural design is a basic principle of universal design.

Macromedia has devoted a part of their web site to accessibility. This more prominent area of the web site was fully established with the advent of the MX series of products. More information on creating accessible Flash and accessible web sites can be found at (<http://www.macromedia.com/macromedia/accessibility/>).

Multimedia (Audio and Video)

There are several methods of making these elements more accessible. For audio files, the simplest is to make the transcripts from which the recordings were made available to staff and students.

Signing Avatar allows web content to be signed if the reader chooses this option. This can be a more expensive solution to creating more accessible web content for those who are deaf or hard of hearing. Multimedia in general is the area where you would be spending more resources. Captioning software is also available for audio files. (<http://ncam.wgbh.org/projects/>). The National Centre for Accessible Multimedia (NCAM) out of WGBH in Boston, has identified some standards and guidelines for captioning (<http://ncam.wgbh.org/projects/>).

NCAM has also produced standards and guidelines for creating accessible mathematics and science software (<http://ncam.wgbh.org/projects/>) and software for adding captioning and video description to video files. Many people may be familiar with captioning. Many of us read the captioning at the bottom of popular television shows while listening to music. This is another example of a tool for people with disabilities being used everyone else! What is video description? For people who are blind or visually disabled, video description provides a bridge during those scenes in television shows and movies where there is sound, action and relevant plot details but no narrative to let them know what is happening. The NCAM tool allows videographers to add captions for people who are deaf or hearing impaired and video description for those with visual disabilities. MAGpie or the Multimedia Access Generator (<http://ncam.wgbh.org/projects/>) is free from the NCAM web site. They also welcome beta testers!

Synchronous Communication

There are many discussions about the importance of chats and other synchronous communication tools in online education. There are a few issues, aside from technical accessibility:

- Students in different time zones
- Adult students with work and family responsibilities who take a distance course for the flexibility
- Students who work nights or different shifts
- Large classes with many students vying for conversation at once

- ESL (English as a Second language) students not being able to keep up with conversations/keyboarding
- Students with low computer literacy skills
- Students with insufficient keyboarding (typing) skills

The issues of accessibility for students and faculty with disabilities include:

- Difficulty in keyboarding fast enough to maintain a conversation or participate in one
- Difficulty in maintaining adaptive technology focus where you need it (often changes in information on a page result in a shift of focus for screen reader and screen magnification) users
- Students with motor skill issues may not be able to target small areas of a pop-up window to access conversations
- As chat tools become more sophisticated, there are more tools such as the ability to “raise your hand”, which are often not labeled with Alt Text, are too small to target, or situated in the interface in difficult places to find or keep track of

The interfaces themselves are often not usable because buttons, menu items and other critical information are not read. The main courseware developers are attempting to fix gaps in accessibility of these tools, but they are a long way from making them usable. The trend now is to combine a chat with a “whiteboard” which is an area where staff and students can share diagrams, files and other project material. Whiteboards by their very nature are inaccessible.

One group is working on finding a solution. The University of Toronto has developed A-Chat which is an HTML based chat tool. Information on this tool can be found at (<http://achat.atrc.utoronto.ca/>). There are still the inherent pedagogical issues and obstacles. Faculty and staff need to ensure that participation in these kinds of synchronous activities have alternate assignments. They also need to ensure that any course content shared in these learning spaces need to also be available in the core content of the course.

Black Holes

As stated at the beginning of the paper, technically more accessible documents are only part of the usability equation. Universal design helps us think about and apply more “document usability” solutions for staff and students

(http://www.georgianc.on.ca/c4a/uid_principles.htm). One of the strengths of online education is that it can provide a vehicle to allow true learner choice in accessing information. If a student is an auditory learner, having the ability to listen to course content, either through a text-to-speech engine or VoiceML tool (<http://www.w3.org/Voice/>), encourages retention course information. Allowing more visual learners the opportunity to read captions or transcriptions of audio files facilitates their learning process. Allowing someone who has to “work in a group” all day, the opportunity to learn in solace meets their needs. Finding a balance of learning opportunities is the goal of all course and curriculum developers.

We must always keep in mind that distance education has its roots in correspondence studies, not in the classroom. Attempting to mirror classroom environments may not be the most appropriate use of online technology. Some things don't translate well to the “online classroom” and create other obstacles to learning.

The nemesis of most students is the slide presentation. If we remember why we have slide presentations, we can avoid their overuse in the online environment. Slide presentations replaced overheads, which replaced the blackboard. They are “index cards” of notes to jog your memory. They are not a substitute for rich content in a course. Taken out of context, they may be meaningless to staff and students. They can support content, but not “be” content. As an example, I was looking for information on voice recognition assessment. I did a search for “voice recognition assessment.” There were four web sites identified as having information on voice recognition assessment. The first one was a slide from a presentation. The slide title was “Voice Recognition”. The bullets below it were: “Do a voice recognition assessment” and “Provide training for the client”. To my dismay, the other three sites were the same, links to slides with the words “ voice recognition assessment” on them. Transfer this experience to an online course and students have an obstacle to learning.

Another obstacle to learning and participation is the “Group” tool often used in online courses delivered through courseware or course management systems. Even if an instructional designer has created the most accessible content, if the course has students creating web sites and conducting peer evaluations, students with disabilities are left out of the process. If the peer evaluations are graded, this may be an obstacle that prohibits students from taking courses. Again, we are trying to mirror the classroom presentation in an online environment. Perhaps we need to discard our theories on correspondence and classroom course delivery and explore more meaningful ways of using the online tool. Perhaps we need to think more in terms of client or student based course design.

UNIVERSAL DESIGN, USABILITY AND ACCESSIBILITY

One of the analogies I've used for years now is that we don't expect our instructors to go into their classrooms and build desks, paint walls, make drapes, or in any other way "build" the learning environment; yet we do expect that they will inherently have sophisticated technical skills, multimedia design skills and the ability to build an online environment that is marketable and financially lucrative.

Coordinating Development

Universal design allows staff and students to create more usable, and more accessible products (http://www.georgianc.on.ca/c4a/uid_principles.htm). Courses that offer choice to students for both learning concepts and doing assignments an evaluative processes can be developed. Many institutions have a decentralized system of academic policies. One department might be quite knowledgeable in the area of universal design, usability and accessibility; while another is struggling just to get something "online" to be competitive. Often there are no campus wide policies on accessibility and online course design, and for those who have put these policies in place, there is no consequence for non-compliance.

The other piece to this is the "decentralization" of the standards and guidelines. Where do you look for current standards and guidelines? Who is working on this, and why isn't there one place I can go to for concise and "plain language" versions of these tools? Where can I find support in the form of institutions which have implemented these standards and guidelines? Perhaps one of the issues that detracts from the implementation of emergent technology, standards and guidelines for accessibility and usability, is that, despite research projects providing framework and tools, no one is actually using these in a significant manner.

It was good enough for the classroom!

As educators, we need to begin thinking outside of the box and the "classroom" if we want to take advantage of online education and learning. We need time to learn about the technology that is available to us. It has been estimated that it takes four times longer to develop an online course than a classroom one. Where do we find the time, how are we compensated, who is there to help us? In an online environment, students have opportunities to talk among themselves outside of the three hour classroom time constrictions, and even expect responses on the weekend! Creating course content to be delivered "just in time" for this week's start date is no longer feasible. Educators find

that they either spend time with the students, or time with the computer creating content, and that trying to do both doesn't serve either well.

SUMMARY

We now have tools that can make our online learning environments not only more accessible to students with disabilities, but also more usable for students in general. To take full advantage of these tools will require commitments from institutions, staff and students. Institutions must recognize that a universal design approach to the online learning environment will require a centralized effort and one component of this will be financial. Just as there is a physical plant maintenance infrastructure, there needs to be an "online plant" maintenance infrastructure with consequences for non-compliance.

Staff and faculty will become more involved in identifying and creating content and not building online environments. They will return to doing what they do best. Students will gain awareness of issues of accessibility and usability related to students with disabilities, but also to their own learning styles and ways of accessing information.

The standards and guidelines identified in this paper are starting points. Since most of them have not been implemented in a concerted effort, the potential for revisions, refining of goals and objectives, and development of new tools is unlimited. By implementing universal design principles, accessibility and usability principles, institutions, staff, faculty and students will benefit.

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