Selecting Assistive Technology for Blind or Low Vision Individuals to Surf Websites

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According to the 2000 census, the number of disabled people in the United States accounted for 19.3% of the people counted. With the advent of the Internet as an information tool, more and more people are turning to the websites as a source of up to date information, including those with disabilities. For many with disabilities, the Internet represents freedom to get information without having to rely on someone else. This is especially true for those who are blind or may have low vision. For a blind or low vision person, what was once a time consuming task to simply get the latest newspaper headlines read to them can now be done at their own leisure by using the Internet and assistive technology. The computer technology that allows a blind or low vision user to access a website is generally selected for them based on their individual needs. In order to select an assistive technology tool for a blind or low vision user to effectively access a website, one must understand web technologies, including web accessibility and multimedia, as well as determine the individual needs through an assessment for the individual user before selecting a tool.

Before any assistive technology is selected for a blind or low vision user to access the web, it is helpful to understand the web technologies. The first technology idea to understand is web accessibility. This is a broad term that is defined by the World Wide Web Consortium (W3C) Web Accessibility Initiative (WAI) as "Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web" (Henry, 2005). People with disabilities have the ability to use the web provided they have appropriate access. This access begins with web developers following standard accessibility guidelines such as the W3C Web Content Accessibility Guidelines (WCAG) 1.0. Wattenbeug (2004) states, "These guidelines provide comprehensive methodology and production standards to begin Web development". This is true for any web

development environment including the development environment in the College of Education. It does not require a great deal of extra work to ensure access according to the guidelines. Unfortunately not all web developers choose to use the accessibility standards or they simply may not know about them. This makes the ability to identify the accessibility of a website critical for the purposes of testing against a product. With this in mind, before selecting assistive technology for a blind or low vision individual, any product selected should well work within the web accessibility standards. It should also work reasonably well with sites that may not follow all of the accessibility guidelines. The laws and guidelines that govern web accessibility currently do not apply to everyone. For many it is simply a best practice that an assistive technologist needs to be aware of.

The next technology idea that needs to be kept in mind is multimedia. This is a technological area that is difficult to select appropriate assistive technology for due to the rapid nature of web development innovations. Web multimedia technologies can include video, sound, and dynamic information. Currently the most popular web technologies that combine all of these aspects of multimedia are Adobe Flash and portable document format (PDF). These technologies can be made somewhat accessible with proper development. Balasubramanian and Venkatasubramanian (2003) illustrate the issue when they say, “Accessibility of multimedia information to vision impaired users has been studied from different angles and various solution have been proposed”. The various multimedia technologies require different solutions. The variety of solutions comes from the different perspectives. Some of solutions are simple low tech such as text description for a multimedia video while others are much more complicated programming for Flash applications. They go on to say, “One common solution is the use of assistive devices to enhance visibility of the information. Tools such as screen readers, audio

HTML interfaces and auditory navigation alleviate some problems faced by users with impaired" (Balasubramanian & Venkatasubramanian, 2003). Assistive technology can only enhance the visibility of information in multimedia provided the enhancements have been build in or alternate access has been provided. This is why the authors say it can "alleviate some problems" (Balasubramanian & Venkatasubramanian, 2003). The Internet is changing rapidly and while assistive technology can interact with some multimedia, it cannot interact with all multimedia. As the web goes more and more towards being more multimedia based and less text only, how assistive technology integrates with multimedia will become more and more important in the selection process.

Once an assistive technologist understands some of the technological needs a person may encounter while navigating a website, it comes time to select an appropriate technology. Before a technology can be selected, careful consideration should be taken to match an individuals needs with an appropriate technology. In an guide for learning disabled individuals Raskind (2006) says, "Selecting the appropriate technology for a student with LD requires careful analysis of the interaction between (a) the individual; (b) the specific tasks or functions to be performed; (c) the technology; and (d) the contexts or settings in which the technology will be used". This can be true for technology being selected for any disability, including blind or low vision individuals. Technology is an individual experience and every individual person is different in his or her experiences, tasks they wish to complete as well as where they live. A research report commissioned by Microsoft stated, "computer confidence is determined by assessing respondents' answers to a range of attitudinal questions about technology and questions about knowledge and understanding of computers" (Stevenson & Kolko, 2004). A person brings his or her own experiences of a disability along with their experience using computer

technology. The experience they have using computers can affect the level of confidence they have in using a computer. The task of navigating a website can be difficult to impossible for a blind or low vision individual who may also be afraid of the computer.

After the individual and task assessment has been conducted, the assistive technology itself needs be analyzed to determine if it will fit a users needs within the environment that user is in. For example, a person who has been recommended that they use speech recognition software could not efficiently use it in a noisy public computer lab. This would be an incorrect analysis of the needs of the person for the environment they are in. It also illustrates the idea that selecting appropriate technology involves more than just linking a disability to a tool that might complete the required task. As a whole, selecting an appropriate assistive technology for someone who is blind or has low vision should involve analyzing the individual with his or her required task, using what possible technologies in what setting.

For an individual who is completely blind, the Internet allows them to find information without having to rely on a sighted person. Due to the person's disability, using a computer to surf the Internet can only be done through some form of high-tech assistive technology. Before selection of an assistive technology occurs, an assessment of the individual needs to take place taking in account the individual needs, the task and the environment the technology will be used. During the assessment of an individual, all concerned parties such as the case manager or assistive technology evaluator, should be involved. In an article by Lueck, Dote-Kwan, Senge, and Clarke (2001), the authors call the assessment "Identifying Personal Preferences and Abilities". They break it down into four basic categories of questions a person should be asked before considering specific technology. The first category is "Individual and Family Choice" (Lueck, Dote-Kwan, Senge, Clarke ,2001). This relates to a persons personal preferences as well

as home situation and attitudes towards completing the task. One of the sample questions the authors asked in the article that relates directly to selecting assistive technology for a blind individual is, "Does the person prefer Braille, print, or auditory input or output? The person may be able to use all three modalities but prefers to use a certain one for a specific critical task" (Lueck, Dote-Kwan, Senge, Clarke ,2001). The next category they discuss is the cognitive or the academic abilities of the individual. A person who lacks the cognitive ability to learn how to use a complex screen reader program may need to be started with a simpler program and work their way up to the more complex program. The third category is the "physical abilities and skills" (Lueck, Dote-Kwan, Senge, Clarke ,2001) of the individual. This deals with what a person can and cannot do physically. The last category is the visual category. Since a person who is completely blind would not have any vision, this assessment category would probably not be needed. However it should be considered for an individual who may be low vision.

After a proper assessment has been completed, it is time to select a technology and train the individual. According to the *Assistive Technology Decision Tree* (UNUMProvident [UNUM], 1999), the "Level of Functionality" (UNUM, 1999) for an individual who is blind would be that they "use other senses" (UNUM, 1999). In this category, they recommend that a person use a screen reader or a Braille display. Since the task is using a computer to access web sites, these recommendations are valid and should be considered.

If the individual ops for a screen reader based on their assessment and personal preference, then the decision comes down to which screen reader. There are many screen readers out there such as Freedom Scientifics' JAWS for Windows or IBM Homepage Reader. A majority of software companies have free trials in which a person can simply install a copy of the software and use it for a short period of time. Free trials can give a person a glimpse into

what it is like using that software for their task. From this they can get an idea of the program is right for them or if they should try another. Once the software is decided upon, then further training should be given to ensure success in the task of surfing web sites. Further assessment should occur as a follow up to ensure this is the correct tool for the individual.

Another recommended tool a person who is completely blind could use to access websites is a Braille display. A Braille display is basically a piece of hardware that hooks in with screen reading software to output Braille in cells on the hardware output devise. For a person to use a Braille display they should be able to answer what type of Braille they are comfortable in using. In an article by Stageberg (2004), she gives advice to individuals considering Braille options when she says, "Keep in mind that the 'perfect' Braille display does not exist. Each model has both strengths and quirks. The important thing is to decide which features are most important to you and which ones you can live without". She further goes on to say individuals need to try out as many of the displays as possible before making a decision. The Braille displays tend to be expensive but if a display that works for a person then ways can be found to cover the cost. Once a device has been selected, additional training should be given to the individual to ensure success in the task of surfing web sites. Further assessment should also be given as a follow up to make sure this is the correct device for the individual.

An individual who has low-vision, has additional options available to them for navigating a website depending on their needs. According to Fay (1998), "Low vision cannot be corrected to normal by regular eyeglasses or contact lens". Therefore the individual would need some sort of assistive technology to complete the task of using a website. Based on the *Assistive Technology Decision Tree* (UNUM 1999), a person with low vision could use a low-tech solution such as a larger monitor or keyboard. They if this is not enough they could also opt for

screen magnification software, screen contrast changing software or even use screen reading software.

With the multitude of options available to an individual who has low vision, they still need to go through an assessment to determine what their needs are. Individual technology experiences and attitudes will differ and thus affect how they will "identify technology needs and how they can be matched to products and training" (Roy, 2003). Depending on the results of the assessment, when it comes time to select a piece of assistive technology, the best method for a low-vision individual is to try out some technology. Starting with the simple options such as trying a larger screen or keyboard could be a solution for some people, but not for all. If a larger screen or keyboard alone does not help an individual, then it is time to start working with screen magnification software. The simplest and most cost effective way to determine if this might help is to turn on the operating system screen magnification. Most modern operating systems have build in screen magnification to assist individuals with enlarging the screen. For many low vision users, the operating system built in software may not have the all functionality that they need, but it will help give them an idea if it is the right direction to go. If the screen magnification does help then, like the screen readers, many of the commercial screen magnification tools available have free trials that anyone can use. In addition to screen magnification, some individuals may also need the contrast changed on the screen. Depending on the software solution selected, some have both screen magnification as well as contrast changing functionality built into the software package. For low vision individuals there are truly a multitude of possibilities that can be selected. However once a solution is selected, then the individual should go through additional training as well as follow up assessment to ensure the solution helping the person complete the task of accessing the web.

In addition to using their eyes, a person with low vision may also want to look into getting screen reading capability or a screen reader software in addition to screen enlargement. This would take additional assessment, selection testing, and training. Based on personal observation, if an individual's eyes tire easily, the ability to switch between magnification and screen reading may ensure they are able to continue using the computer for the duration of the task. During the assessment process for screen magnification tools, questions should be posed to determine if a person might benefit from screen reading. Some baseline needs for determining if they would benefit from having both technologies could be if they need to use a computer to surf the web for an extended period of time. Another need that can help determine if they would benefit from both technologies is if the individuals' eyes tire easily even when using assistive technology. Based on this information and more, if the person is determined to be a fit for using both screen magnification as well as screen reading software, then software should be carefully selected. Some screen magnification software has built in screen reading capability. Not all screen magnification software with built in screen reading may fit the individual. Several software or hardware technologies may need to be selected depending on the individual. Training in how to use the technology to complete the task and further assessment should follow with any selection of assistive technology.

No matter what technology is selected for use in assisting a low vision or blind individual to navigate a website, it must be selected carefully for the individual. Before selecting an assistive technology tool for a blind or low vision user to effectively access a website, one must understand web technologies, including web accessibility and multimedia, as well as determine the persons needs through an assessment for the individual before selecting a tool. The Internet is a rapidly changing environment. Knowing how to identify accessible websites and multimedia

quarks can help the person running the assessment identify quality tools for the task. Each person seeking to use assistive technology is also unique in their experiences, attitudes toward technology, and disability. Proper and continuing assessment, testing of possible solutions, and training is the key for a person to select assistive technology to be able to surf the Internet.

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