INTEGRATING ACCESSIBILITY INTO THE INFORMATION SYSTEMS CURRICULUM

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ABSTRACT

An increasingly important topic in the field of information technology is accessibility, which means that information systems can be effectively used by people with disabilities. U.S. Federal regulations require accessibility for certain types of informational systems and web sites. Accessibility is not a topic that has been addressed in the information systems curriculum in the past. This paper presents information on accessibility, and the related technological and legal issues. Advice on how best to incorporate the topic into an undergraduate information systems curriculum is presented, along with specific courses in which accessibility would be a good fit.

Keywords
Accessibility, Curriculum, Usability, Section 508, User-Centered Design, Human-Computer Interaction, Universal Design

INTRODUCTION

Information systems accessibility means to design information technology so that it can be utilized by people with disabilities. Information technology can help Alevel the playing field≅ for people with disabilities, by allowing all people to have full access to information and communication tools, regardless of any physical, motor, or cognitive disability. Information systems programs have not incorporated accessibility into their curricula. However, the topic of accessibility is gaining attention, and the information technology community is starting to focus more on designing informational systems and web sites that are accessible. It is therefore necessary to incorporate the topic of accessibility into the information systems curriculum. This paper will provide an introduction to the topic of accessibility, and then provide suggestions on how best to incorporate the topic of accessibility into the information systems curriculum. Specific courses will be discussed in the context of a discussion of accessibility.

There are a number of reasons why the topic of accessibility is starting to get more attention. Within the academic community, the concept of universal usability has been gaining attention. Universal usability means to design information systems for the wide range of users, including older/younger users, males/females, and users with disabilities (9). The first ACM (Association for Computing Machinery) conference on universal usability was held during Fall 2000 (http://www.universalusability.org).

Within the information technology community, and especially with the current tight economy, companies are looking for ways to increase their revenues. One way of possibly increasing revenue for a company is to expand the target market of those who can purchase their products. In the information technology community, this means both that 1) companies can sell more software products if they make their products usable by people with disabilities, and 2) e-commerce companies can increase the number of possible customers (and hopefully, the number of sales) by making their web site usable by people with disabilities. One estimate is that as many as 400,000 people with visual impairment use "screen reader" software (discussed later in the paper) to browse the web (12). This means that, by making an e-commerce site accessible to users with visual impairment, you can immediately increase your possible customer audience by almost half a million users. Another estimate is that 13.1 million people in the United States use some form of assistive technology (8). If computer technology is inaccessible, it means that these millions of people cannot benefit from the resources available from computerized databases, web pages, and other technological resources. The World Wide Web Consortium has made accessibility a priority through their Web Accessibility Initiative (http://www.w3.org/wai). The Web Accessibility Initiative provides a number of resources for making web sites accessible, such as guidelines, checklists, and software testing tools. But probably the initiative that has brought the most attention to the area of accessibility comes from the U.S. Government. This initiative is known as Section 508.

Section 508 of the Rehabilitation Act was amended in 1998, and it specifically requires that the U.S. Federal Government only purchase information technology that incorporates accessibility features. Furthermore, Section 508 requires that U.S. Federal web sites and certain related categories of web sites be accessible (http://www.section508.gov). These provisions of Section 508 went into effect June 21, 2001. Since the U.S. Federal Government is one of the largest purchasers of information technology, many information technology companies have started to work on making their products Section 508-compliant. For instance, companies such as Adobe, Macromedia, Compaq, and Hewlett-Packard are starting to focus on the area of accessibility (7). In addition, those who work in the field of web design are starting to become familiar with the steps needed to make a web site accessible.

HOW DO YOU MAKE AN INFORMATION SYSTEM ACCESSIBLE?

The process of making an information system accessible can be summarized in one word: FLEXIBILITY. Accessible information systems are flexible information systems, with regard to input, display, and output. Input should not be limited to a keyboard and mouse. Output should not be limited to a screen and ink-jet printer. Font sizes, colors, and response times should be flexible. Users should be able to customize their technological environment, and possibly utilize other types of input and output devices, called assistive technologies, that will meet their specific needs (1). Assistive technologies

include Braille printers, screen readers, touch screens, and adaptive keyboards. The operating systems, software applications, and web sites should be flexible enough, to work with whatever input or output devices are needed by the user with disabilities.

For a detailed example of accessibility, it is useful to examine what makes a web site accessible. It means that a user should be able to access the content on the web page, regardless of their special need. So, if a user has a hearing impairment, they will need a transcript of any streaming audio. If a user has a visual impairment, they will need textual equivalents for any graphics (8). Web navigation must be provided in a textual manner (or textual equivalents must be provided), so that the user can access the content, even if they cannot use a mouse to browse a graphical site map (5). Information should not be presented using only color, since some users may have color-blindness. If data is presented using a pie chart, the actual numerical data should also be included in textual format. This is not to say that all graphics should be eliminated. Rather, equivalents should be provided, that can be interpreted by the user=s machine. The user may have a range of assistive technology software or hardware devices installed. For instance, a user with visual impairment may browse the web using a screen reader application. A screen reader application (such as IBM Home Page Reader) will provide the user with output, in the form of computer-generated speech (8). The screen reader essentially Areads out loud,≅ for the user, the content that is on the web page. The actual screen reader software (or other assistive technology) being utilized by the user is not relevant to the web site designer. What is relevant is that the web site designer makes sure that there are textual equivalents of all graphics and multimedia, so that whatever assistive technology the user has, that system can interpret and deal with the text on the web page. Specific guidelines for web accessibility are provided by the Web Content Accessibility Guidelines, at (http://www.w3.org/wai).

INFORMATION SYSTEMS CURRICULUM

While accessibility is a major trend in information systems, it has not been a component of the information systems curriculum in the past. The information systems curriculum is constantly changing, to address new technologies, new opportunities, and new threats. For instance, in the early 1990s, the IS curriculum changed to reflect the increasing focus on the Internet and World Wide Web. In the late 1990s, E-commerce became a major component of information systems programs. The topic that has recently been getting a lot of attention is information and network security. However, the business and government communities are starting to have a need for students familiar with accessibility issues. It would be ideal for a university to teach a new course in the information systems program on accessibility. Due to the nature of the course approval process and academic scheduling, it can take nearly a year or more to get a new course approved and included in the course schedule. In addition, many academic programs do not have space in their programs for a new course, nor the resources or faculty to teach such a course. Within these limitations, it seems best to incorporate the topic of accessibility into currently-existing courses in information systems. Even one lecture on accessibility is better than completely neglecting the topic. By doing so, students who complete an information systems program will at least be aware of and sensitive to the issue of accessibility, and will know where to find more resources on the topic. There are a number of courses in which accessibility would be an

appropriate topic, including Systems Analysis and Design, Web Design, E-Commerce, Human-Computer Interaction, and Computer Ethics.

Systems Analysis and Design

Nearly all Information Systems curricula include some version of the Systems Analysis and Design course. In systems analysis and design, students study the process of building an information system, including such areas as project specification, requirements gathering, conceptual design, testing, training, and implementation (3). The focus of this course material is on building an informational system that meets the needs of the users. It is therefore appropriate to bring up the question of what to do when users have a disability. Regardless of whether an information system is built-from-scratch, or is purchased, or leased, accessibility is an important topic which should be addressed in systems analysis and design. Since a good number of students may eventually work for the U.S. Federal Government (or related subcontractors or consulting firms), the topic of Section 508 should be discussed in the class. If students are either creating a new system, or studying the process of building a new system, students could examine how a user with a disability would interact with the new system, looking at assistive technology input devices, and which software packages would be compatible with those assistive devices.

Web Design

Another possible course in which the topic of accessibility could be incorporated is a web design class. Of course, there are many different approaches to teaching web design: programming (HTML, JavaScript, Java, Cascading Style Sheets), software (FrontPage, Dream weaver), and usability (download speed, navigation, information architecture, page layout, etc.) tend to be major topics in a web design course (4). Unfortunately, a majority of web sites suffer from accessibility problems which make the sites hard to use or even impossible to use for users with disabilities (6,11). The accessibility of web sites is therefore an appropriate topic in these courses, and it would be helpful to present to the students the guidelines from the Web Accessibility Initiative (http://www.w3.org/wai). In addition, it might be useful to demonstrate a software tool for testing a web site for accessibility, such as BOBBY (http://www.cast.org/bobby).

E-Commerce

E-commerce courses should certainly address the topic of accessibility. By making a web site accessible, it is possible to immediately increase the number of potential customers for an e-commerce site. The idea of accessibility for e-commerce sites can be presented this way: if a brick-and-mortar store has 6 steps in front of it, the store automatically excludes a certain number of people from shopping there, and those people using wheelchairs, walkers, or canes may be hesitant to enter the store. Building an e-commerce site that is inaccessible similarly would disenfranchise people who otherwise would be customers. To understand this concept, students could attempt to purchase a product on an e-commerce site, or even search for an item, without using graphics. To do this, students could use a non-graphical web browser (such as Lynx), or just turn off the graphics in the graphical browser, and then attempt to navigate the e-commerce site (5). Students will quickly see that building inaccessible e-commerce sites is simply not good business.

Ethics

Depending on the nature of the IS department, an ethics course may have a variety of foci: business ethics, computer ethics, social impacts, or general ethics. In many of these courses, the topic of the ADigital Divide≅ may come up, relating to the idea of making sure that all people have access to information technology and the related information available via the Internet and World Wide Web (2). The question can be posed to students, AWhat if you make the computer technology available, but people find it impossible to use the technology?≅ Another question to ask is "What responsibilities do we have to users with disabilities?" These are two interesting questions to ask, that may encourage students to ask different accessibility-related questions in the more technically-oriented information systems classes.

Human-Computer Interaction

Classes in the area of Human-Computer Interaction are increasingly being offered in information systems programs. The Association for Information Systems has even added a special interest group on Human-Computer Interaction (SIGHCI). Classes on the topic of human-computer interaction may fall under the titles of AInterface Design≅ or AUsability Testing≅ or something similar. In these classes, it is common to study the specific interface needs of special populations, such as younger users or older users. Users with disabilities can be discussed as a separate user population, with attention paid to their respective needs in a user interface (10). In addition, input and output devices are traditionally discussed in a Human-Computer Interaction course (10). It might be useful to examine the input and output devices used by people with disabilities, including pointing devices, touchscreens, modified keyboards, speech synthesizers, and braille displays (1).

Other courses

While these are some courses in which accessibility could be incorporated, the topic of accessibility might come up in other courses, as well. For instance, when the information systems program is located within a business school, students frequently take a course in business law. The topic of accessibility might come up in law classes, for a number of reasons. Aside from the Section 508 regulations, there have been a number of lawsuits related to accessibility, most of which have been settled out-of-court (such as the National Federation of the Blind vs. AOL), which may provide the basis for an interesting discussion (8). In addition, other countries, such as Australia, Canada, and Portugal have government or government-related efforts underway, related to accessibility (8). The topic of accessibility may provide interesting discussions in many information systems courses or other related courses.

SUMMARY

Accessibility of information technology is a growing trend. Universities are creating the next generation of systems analysts, IT consultants, programmers, network managers, and IT project

managers. It is the responsibility of information systems programs to make students aware of the important topic of accessibility, and sensitize the students to the needs of users with disabilities. Therefore, the topic of accessibility should be integrated into the information systems curriculum. This paper provides a background on the topic of accessibility, and offers suggestions on how to integrate accessibility into courses that are commonly offered as a part of the information systems curriculum.

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