

## ACCESS FOR EVERYONE: INTRODUCING ACCESSIBILITY ISSUES TO STUDENTS IN INTERNET PROGRAMMING COURSES

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**Abstract** *Several Computer Science departments include Internet or Web Programming courses for both Computer Science majors and non-majors. A large component of these courses is Web page development and design using HTML and other technologies. While the need for increasing the level of accessibility to Web resources by the disabled has become more prominent in recent years, the topic is often missing from these relevant courses. This paper presents the need for introducing accessibility topics as well as the technical details and tools that can be used to create more accessible Web sites and software.*

**Index Terms** *accessibility, internet programming, web programming*

### INTRODUCTION

Access to information is the heart of the World Wide Web. The issue of accessibility, especially to the disabled community, continues to be an issue that needs to be addressed by Web developers. Merely uploading a page with some content is not enough, especially to online businesses and other institutions. Content, textual or multimedia must be legible and attainable to the intended user group. Whether the users are students, investors, or customers, the user group is diverse enough to include the disabled.

The visually impaired, the hearing impaired, and individuals with mobility impairments (e.g. arthritis) are among those impacted by inaccessible Web sites. Based on Census data from 1997, 1 in 10 Americans has a severe disability which has an impact on the amount or kind of major life activities, such as attending school or working [3]. While not all of the disabled have difficulty accessing Web sites, the numbers of those users with such difficulty will increase as the population ages.

Legislation that has recently come into effect in the United States, has expedited the need for Web sites to become more accessible to the disabled. As such, the need for Web developers to be knowledgeable in Web site accessibility techniques will become more important in the coming years. Web programming course instructors can provide an opportunity for students to acquire such valuable skills.

Instructors can introduce accessibility as a topic by itself, but integrating the topic into current lessons is a better approach. The advantage is that students will not see

accessibility as an afterthought but instead as a part of the process. Also integrating accessibility into the curriculum will enable instructors to include accessibility requirements into hands-on assignments.

Besides presenting the need to include accessibility into the curriculum, a variety of lecture topics and assignments will be presented. These topics and assignments have been used in the author's Introductory Internet programming course. In addition, several Web sites are provided to educate instructors and students alike.

### THE NEED TO INCLUDE ACCESSIBILITY

Accessibility issues, techniques, and tools are missing from mainstream Web programming courses. Texts and most Web design books do not discuss accessibility either. While several advocates for the disabled and Human-Computer Interaction researchers have brought accessibility issues to light in recent years, the average Web developer is ignorant as to why accessibility is important and what can be done to increase accessibility to the Web.

When the need for inclusion is put into perspective and the expectation of accessible Web pages is communicated, students are more likely to take accessibility seriously than if the topic were mentioned in a short lecture. The disabled are consumers, employees, students, and members of society. They need to purchase products, work, and access information as much as anyone else. As universities and other institutions launch portals to provide online services and access to information, the need for accessibility is as important as ever.

Inaccessible sites happen and the inconveniences to customers needs to be shared with both current developers and future developers (students). For example, the author knew of a blind investor who could not access his account information using a screen reader from a major online firm's web site. He was simply told that it wasn't supported. Also, students who are visually or hearing impaired often have difficulty experiencing the animation or audio clips available at some sites that target their demographic. The result is that the site loses potential customers and schools (and other institutions) are not providing information to students/consumers. Examples of circumstances that students can relate to are needed in order to put the issues into perspective for students who either do not have a disability or know someone who has a disability.

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### LECTURE TOPICS

Many Internet and World Wide Web programming courses cover a wide array of lecture topics concerning the technical and aesthetic details of Web site design and maintenance. In the author's course, several weeks are spent on HTML, graphics, layout, and maintenance. Additional topics are introduced concerning related topics, including accessibility and assistive technologies. Rather than append accessibility as a single lecture at the end of the course, the topic is broken into parts and integrated into all Web design topics.

The need for accessibility is mentioned early in the course. Rather than mention the need for access by the disabled as that of an insignificantly small group, the author stresses the need to open Web sites to all potential customers or users. Also mentioned is that the disabled community is not as insignificant as most people think – citing statistics when possible [3, 7]. The author's university, large urban institution, is shown as an example of a diverse community with member's who would benefit from increased accessibility to online resources. From time to time a disabled student is enrolled in the course though he or she is never made to stand out as an example.

#### HTML and Other Technologies

During the HTML lessons, tags that make pages difficult to navigate are mentioned and tags (or attributes) that allow greater accessibility are introduced. For example:

- The use of <B> for Boldface and <I> for Italics cannot be read by screenreaders. Better alternatives are <EM> and <STRONG> for boldface and italics.
- Include ALT attributes in order to describe image or multimedia elements.
- Use relative sizing for table sizes.
- Summarize data tables using the SUMMARY attribute in the initial TABLE tag.
- Include alternatives to frames using the NOFRAME tags.

Even the supplemental multimedia and programming content allows for discussion insofar as the extent to which different technologies allow for access by various populations. For example, Java has an accessibility API. Also until only recently has Macromedia and Adobe addressed accessibility in Shockwave, Flash [5], and PDF content. The vast majority of designers do not address accessibility and examples of "flashy" sites can be shown that would be difficult for some disabled groups to access.

#### Web Page Design

Besides the technical details, several design lectures are presented. During site design lectures, the legibility and layout of content is stressed. The importance of contrast, consistency, and complexity is also discussed in the context

of accessibility. To demonstrate the use of color, small sample pages can be created in addition to the use of Web sites dedicated to demonstrating the impact of color [6, 8]. During these lectures, the advantages and disadvantages to using common layout techniques such as tables and frames are discussed. The point needs to be made that a popular design technique is not necessarily a good technique (for accessibility in particular)

#### Accessibility Tools and Assistive Technology

Miscellaneous topics are also presented regarding assistive technology, legislation to promote accessibility, and tools available to create and assess pages for accessibility. When possible, a tour of a computer lab using assistive technology would provide a concrete lesson for students. Having a class with 120 students did not make a tour possible, but the author has demonstrated examples of assistive technology when possible. When time permits, a guest speaker from the campus' Disabled Student Resource department is invited to share insights and resources with the class.

Since accessibility is usually not discussed in texts, current online articles regarding legislation and general readings in accessibility are provided as supplemental reading material [2, 7, 9]. Tools can also be demonstrated to allow students to create pages and test them for accessibility according the World Wide Web Consortium (W3C) standards [2, 10]. Since Section 508 of the Workforce Investment Act of 1998 has come into effect, more tools are available for developers.

For example, Dreamweaver users can now create more accessible pages [4]. The new version of Dreamweaver (Dreamweaver MX) is also supposed to include a feature where a report is generated to assist developers in the creation of more accessible pages including suggestions. A free option is the use of online tools like Bobby [1]. Students can check their pages individually using Bobby, which examines the HTML of a web page according to the W3C standards and generates a report. The author demonstrates Bobby using the main page of the course Web site and then discusses the results, which contain warnings and various information. Students are encouraged to test their web pages in order to assess the accessibility of their web pages or other pages that they wish to examine.

Several opportunities exist to introduce accessibility during the course. Gradual presentation reflects the integration of the disabled into mainstream society, rather than as something to be mentioned briefly, separately and in passing.

#### ASSIGNMENTS

Assignments are an opportunity for students to practice the concepts discussed in class. During all HTML assignments, whether coded "by hand" (typed) or via a WYSWYG tool, students are required to create pages that meet

predetermined accessibility standards (based on a subset of the W3C standards). These standards are included with the assignment description, and are intended to enable students to acquire some degree of experience with the concepts presented in class. For example, the requirement that every image and animation must have a descriptive ALT attribute is included in the relevant assignments.

The use of accessible HTML tags and attributes does not result in a delay in grading. If the code is already being graded, then the addition or revision of a few tags and attributes will not negatively impact grading time.

Besides Web page design, the topic of accessibility has also been included on a list of topics for a written assignment. In this assignment, students sign up for a topic, research the topic, and write a four-page paper on the topic. A different angle on the written assignment has been for students to write an online paper (in HTML) rather than merely word-processed. The online papers have enabled students to read each other's work and for students to share information, resources, and perspectives.

Potential assignments for an advanced course would enable students to apply their skills to develop accessible sites and applets. An ongoing project would allow students to develop an accessible site using current development tools, following accessibility standards. Another useful project would allow students to remodel an existing site to be more accessible. In both cases the information and services can consist of text, images, and other multimedia. In addition, the services that include forms connected to databases can be revised to be more accessible, and applets can be implemented using accessibility APIs.

## RESPONSES

Students do seem to get the message, at least in the short term. When accessibility requirements have been required for web page assignments, the students follow the requirements that are presented to them. The students follow the requirements consistently from assignment to assignment. In regard to the final exam, the questions on accessibility are answered correctly by nearly all of the students who attend lecture. Since the course is only for one semester, no information is available as to whether the students continue to add accessibility to their web pages.

At the end of the course, several students have expressed an interest in the topic as well as their appreciation of the discussion. Most of these students have close relatives who would benefit from more accessible Web sites. In addition, students with disabilities have expressed appreciation that their needs are being addressed and discussed as a part of overall Internet participation.

## SUMMARY

Access to online information and resources needs to be expanded to include a wide variety of groups, including the disabled. If the Internet or Web Programming courses are meant to instruct prospective Web developers, for personal use or as part of a career, the course is the right time to expect students to create Web sites that are available to a wide audience. As part of instruction the hands-on assignments, supplemental readings, and instructor-lead demonstrations will introduce students to the need for creating accessible Web sites. In addition, making accessible Web site development a part of the process from the beginning will allow the task to become a natural part of Web site development.

Of course, the instructor should make sure that the class Web site is accessible so that he or she will be a good role model.

## REFERENCES

- [1] CAST. Welcome to Bobby 3.2: CAST, 1999. Online. Internet. [April 20, 2000]. Available WWW: <http://www.cast.org/bobby/>
- [2] Chisholm, W., Vanderheiden, G., and Jacobs, I. (Eds.) HTML techniques for web content accessibility guidelines 1.0, 2000. Online. Internet. [December 20, 2000]. Available WWW: <http://www.w3.org/TR/WCAG10-HTML-TECHS/>
- [3] Kraus, L., Stoddard, S., and Gilmartin, D. Chartbook on disability in the United States, 1996. Online. Internet. [August 10, 2001]. Available WWW: <http://www.infouse.com/disabilitydata/chartbook.choices.html>
- [4] Macromedia. Accessibility, 2001. Online. Internet. [June 2, 2001]. Available WWW: <http://www.macromedia.com/macromedia/accessibility/>
- [5] Macromedia. Flash accessibility, 2001. Online. Internet. [April 20, 2001]. Available WWW: <http://www.macromedia.com/software/flash/productinfo/accessibility/>
- [6] Manley, E. Colour tester, 2001. Online. Internet. [June 10, 2001]. Available WWW: <http://www.TessPub.com/colours.html>
- [7] Paciello, M. Web accessibility: 500 million and growing, 2001. Online. Internet. [June 15, 2001]. Available WWW: [http://www.webreview.com/2001/03\\_16/webauthors/index04.shtml](http://www.webreview.com/2001/03_16/webauthors/index04.shtml)
- [8] Rigden, C. Safe web colours for colour deficient vision, 1998. Online. Internet. [August 11, 2001]. Available WWW: <http://www.labs.bt.com/people/rigden/colours/index.html>
- [9] Tillett, L. Web accessibility ripples through IT, 2001. Online. Internet. [April 20, 2001]. Available WWW: <http://www.internetweek.com/newslead01/lead021201.htm>
- [10] UCLA Academic Technology Services. Web accessibility, 2000. Online. Internet. [April 20, 2000]. Available WWW: <http://www.dcp.ucla.edu/resources/accessibility.htm>