

**Synthesizing Ideas From Human Computer Interaction and Programming Languages for
Web Applications**

**Examining the Barriers to Web Accessibility and Determining Where Reform May Be
Most Effective**

A Thesis Prospectus
In STS 4500
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On my honor as a University student, I have neither given nor received unauthorized aid
on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

The internet is a party and everyone is invited but, you, a hypothetical third person with a disability, cannot come. The issue of web accessibility (the extent the web is able to be used by individuals of differing ability status) dates back to the early web; no longer just text on a screen, the graphical web made websites able to be wildly different from one another which brought about the need for more advanced assistive technologies for the web (Ellcessor, 2010, p. 290). As the internet becomes more integrated into society, the lack of accessibility features makes it more difficult for those with disabilities to engage with it and the rest of the world (Palmer & Palmer, 2018, pp. 399-400). The lack of accessibility causes a barrier for people to access online critical and non-critical services such as health care services or academic resources (Alajarmeh, 2021, Table 10; Erikson et al., 2013, Figure 2, Palmer & Palmer, 2018, p. 399). Looking at a specific case of inhibited web use due to poor accessibility, in a study by Erikson et al. (2013) where researchers monitored how participants used community college websites, it was found that “[t]hree quarters (77%) of all participants [including participants with disabilities] had difficulty finding major content such as the student disability services page” (p. 870).

In order to improve accessibility in the web, I propose two projects. For my technical project, I intend on synthesizing the ideas from two classes offered by the University of Virginia to widen the software engineering perspective on web accessibility. For my STS research project, I propose analyzing the sociotechnical system around the matter of web accessibility to determine the best approach for improving web accessibility.

Technical Topic: Synthesizing Ideas From Human Computer Interaction and Programming Languages for Web Applications

My anticipated technical project is a paper to bring forth the importance of implementing web accessibility throughout the web development process and challenging existing web development attitudes. Early in the development of the web, implementing accessibility in web applications was an afterthought; these attitudes can be seen in many books about web development prior to the turn of the century which label accessibility features in web languages as having a different purpose and reason for use not related to enabling use for individuals with disabilities (Ellcessor, 2014, p. 452). From this came myths about implementing accessibility: accessible websites are aesthetically unappealing or otherwise plain, accessibility comes with great costs or difficulties, and accessibility benefits an insignificant number of individuals to be important (Ellcessor, 2014, pp. 453-456). While changing perspectives on accessibility for older web developers is more difficult, educating future web developers in the importance of accessibility may prove to have fruitful returns and gradually change developer attitudes about accessibility.

The University of Virginia (UVA) offers two electives that explore facets of web development: CS3205 - Human Computer Interaction (HCI) and CS4640 - Programming Languages for Web Applications. HCI is about understanding how humans and computers interact; two critical concepts in HCI are understanding the users and creating usable technologies. Understanding users is quite intuitive, though it is often generalized to the able-bodied user of a primary target demographic, unless specifically targeted towards those with disabilities (Ellcessor, 2014, p. 452). Usability, on the other hand, is not merely ensuring that a technology is functional, but rather ensuring a user is able to use the technology without being

inhibited by its design; in other words, it is positive user experience (Erikson et al., 2013, p. 874). As seen below in Figure 1, usability is not the same as accessibility but for a technology to be usable requires it to be accessible.

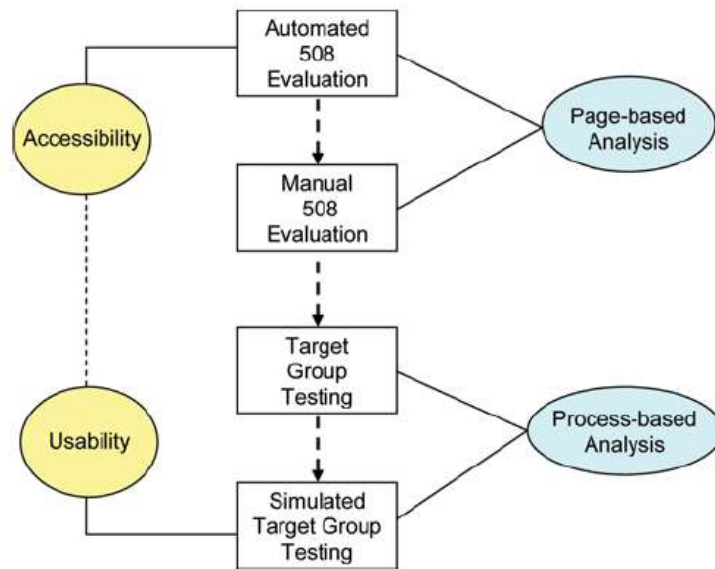


Figure 1 Evaluation methods used study about the accessibility of community colleges' websites that displays the interrelated nature between accessibility and usability (Erikson et al., 2013, p. 867)

Programming Languages for Web Applications teaches, among other web development languages, Hypertext Markup Language (HTML). HTML is a commonly used language for graphical web development that describes the contents and overall structure of the document for web browsers to display it (Krepp, 2014, p. 101). HTML has accessibility features integrated into the language and Programming Languages for Web Applications teaches, on a high level, how to utilize such features (Michalska et al., 2014, pp. 996-998). Automated testing tools to verify the accessibility of an HTML document are also briefly discussed. However, this topic is not elaborated on in much depth.

UVA's approach to how they teach their students can be enhanced by synthesizing ideas from both classes in order to make a more complete understanding of accessibility in the web

and how it might be achieved. The intended deliverable of the project is a paper that elaborates on the common ground between the two classes to make accessibility a conscious choice during development rather than being an afterthought that is tacked on at the end. This paper will build on the ideas presented in HCI and Programming Languages for Web Applications; specifically, it will focus on ideas of understanding users and using HTML to foster usability and accessibility in web applications. I will also attempt to include additional information not present in either class to improve understanding about the importance of web accessibility.

STS Topic: Web Inaccessibility and What Can be Changed to Improve the Situation

The problem of web accessibility goes beyond the actions of web developers. The United States has two primary accessibility guidelines: the Web Accessibility Content Guidelines (WCAG) and Section 508 of the Rehabilitation Act (World Wide Web Consortium, 2018; Palmer & Palmer, 2018, p. 404). The WCAG details best practices in order to make the web more accessible and is made by the World Wide Web Consortium (W3C) which is an international organization that develops standards for the web (World Wide Web Consortium, 2018). Section 508 of the Rehabilitation Act is federal legislation that rules that all federal websites must be accessible (Palmer & Palmer, 2018, p. 404).

However, traditional regulation is not the only way disability legislation comes about. One method for making accessibility legislation is negotiated rulemaking where corporations and individuals with disabilities come together in mutual agreement about web accessibility regulation (Moroney, 2021, pp. 1599-1606). Going beyond legislation and looking at the greater sociotechnical system surrounding web accessibility, summarized below in Figure 2, one can see the other factors contributing to the issue of web accessibility. Discrimination lawsuits play an arguably more effective role than legislation in inciting change to make companies' websites

In light of these contributing factors, not much progress has been made in the way of web accessibility. In general, a majority of websites fail to be accessible for those with disabilities; a report commissioned by the United Nations found that only 3 of the 100 homepages for various websites from 20 different countries examined completely followed WCAG guidelines (Nomensa, 2006, p. 7). There is a lack of web accessibility in the face of contributing factors: regulation, lawsuits, web developers' ethical responsibilities, and cultural pressure. Which factor and how might it be most effectively changed in order to make the web a more accessible place?

An analysis of the sociotechnical system, both past and present, will help to get a clear understanding of how all came to be the way it is today regarding internet accessibility. Ellcessor has two works that do a deep dive into facets of the issue of web accessibility: one (2010) that explores the legal history of disability legislation in the United States and the other (2014) that explores the myths about web accessibility in development. A similar analysis, in depth but wider scope, will solidify understanding of the current state of web accessibility. By examining the attempted reforms to the system in the past- such as the differing interpretations of the law- and their shortcomings can illuminate where reform may be ineffective (Palmer & Palmer, 2018). Similarly, by seeing the failures at reform in the past, the conclusions I may draw about where reform will be most effective may not fall into the same pitfalls. Conversely by examining the state of current factors, their effectiveness, and comparing them to their past states, I may be able to gauge where reform is either not needed or will be less effective. Ultimately determining where the responsibility lies in the issue of web accessibility will be the first step in determining where making reforms will be most effective in making the web more accessible.

Conclusion

In an attempt to reform the web developer's mind on the matter of web accessibility, my intended capstone project will be a paper that synthesizes the ideas from two UVA classes that deal with the matter of web development. This synthesis may provide a more comprehensive educational foundation for web developers on the importance of accessibility in the web and the ways in which to implement such features. In tandem with my capstone project, I intend to perform a sociotechnical system analysis of the situation to better understand the contributing factors and pinpoint where reform might be most effective in order to improve the accessibility of the web. This research may create a more comprehensive picture of the what factors contribute to web accessibility and what actions may be taken to make the web more accessible which may improve people's understanding of the problem of web accessibility. Should these projects be successful, they could improve the importance of the idea of having an accessible web and contribute to making a more effective reform to make the web more accessible.

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