

Front-End Development and its Impact on End-User Interaction with Companies

The Lack of Language Representation in Web Applications and its Effects on Spanish Speaking Immigrants in the Northern Virginia Metropolitan Area

A Thesis Prospectus

In STS 4500

Presented to

The Faculty of the

School of Engineering and Applied Science

University of Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science in Computer Science

By

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October 27, 2022

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

It is no secret that the world has become increasingly technology based, not just with smart phones and automated vehicles, but containing thousands of platforms in which people absorb information. Many, if not all, people use web applications daily either in their personal or professional lives. These applications are made through the Front-end development process, where programming languages such as CSS and HTML, are used to create an easy-to-understand client facing interface (Lindley, 2019). Front-end developers hold a lot of power over the way content is portrayed and who has access to such information on web applications. Through several means both implicitly and explicitly, front-end development affects the user perspective in the structure and influence of user experience. The effect of front-end can influence the relationship users have with companies as well as how interactive the application is with users. This affects the online branding of companies and how easy it is to maneuver through web applications in terms of accessibility. As the internet evolves, accessibility of web content and the user interface must be considered through all development stages. Through my technical and research topics I will dive into some of the effects front-end development has on portraying messages and how certain design implementations impact the users themselves. The technical topic will examine the process of how company imaging is portrayed through the front-end and how it consequently determines the level of success for companies in a digital landscape. The STS topic will focus on a different side of front-end and user perspective, mainly how does front-end development alter and marginalize certain groups of users, specifically Spanish speaking immigrants in the United States. Front-end development holds a substantial amount of power in perception and access to users. These topics will further explore how it shapes both a user's view of the platform and how the platform views them.

Technical

The internet contains a wide variety of products and services, all clicks away and easily available on our screens. While many businesses still have physical locations, their online presence has become an important form of interaction between them and potential customers. Websites should be clear, concise, and organized in a way that puts the company's best foot forward. This process can be achieved through front-end development, a process that uses languages such as HTML, CSS, JavaScript to create a user interface that engages users interact with web applications and other platforms (Lindley, 2019). The combination of these three languages helps with encoding a design, managing user input, and create an overall structure design to maintain a web application. Front-end developers are essentially the architects that build the framework in which customers interact with businesses and help bridge that gap between the two parties.

Over the summer I experienced first-hand the role that front-end developers take on and the importance of communicating the company's image over a digital framework. During my internship I worked on a team of front-end developers to establish a web application for a second-tier airline company that would establish their online presence and create a loyal customer base. The objective was to create this digital platform to elevate the client's image through inclusive features, modern themes, and clear information. The airline company itself was fictional and all a part of a simulated work - client relationship established as a learning objective in my internship. The intent of this learning process was for interns to gain an understanding of real client work in a safe and open learning environment through meetings, but also understanding the technical work needed to deploy a functioning web application from beginning to end. By employing an agile

software approach and open collaboration, we were able to integrate a successful program that met the clients' needs and goals.

Research

The United States is home to 47 million foreign-born people as of April 2022 (Camarota & Zeigler, 2022). Historically speaking those who immigrate to the U.S. are typically low-income, non-English speaking people who are looking to leave situations of violence, have financial troubles or are looking for more prosperous opportunities. When coming to the United States, many are trying to adapt to American culture and transition from the nation they once lived into their current one. In today's modern world, technology has provided several resources that help with immigrant integration. However, when looking for online resources, many websites are primarily written in English. For immigrants with low proficiency in English, the language barrier limits how they connect with American culture and society digitally. In turn, it further isolates immigrants from educational and economic growth. This introduces the question of how the lack of language accessibility through front-end development further marginalizes non-English speaking immigrants from American culture. Spanning off from this, I will be diving deeper into the question to analyze how this barrier impacts Spanish speaking immigrants located in the Northern Virginia Metropolitan Area. Internet accessibility is an important aspect of equitable technology. Accessibility standards must be considered not only in the physical world but also digitally.

Several studies have shown there is a lacking effort in front-end development on incorporating accessibility standards in the development process. For example, a previous study done by Miranda & Araujo (2022), analyzed different company approaches to accessibility

requirements given their web technique. The results of the analysis found that many web developers only had basic understandings of accessibility measures, were unaware of company-issued accessibility trainings, or there was no role assigned to enforcing accessibility throughout the development process (Miranda & Araujo, 2022). There were several more lacking measures that were mentioned, but through just some of these measures there is already an understanding that there is no clear role within companies or software programs that requires that software developers implement accessibility. It has not been engrained in a developer's training how important accessibility can be and with lack of acknowledgement from companies or clients, accessibility is viewed as second rate or unimportant. Following, a similar systemic review was performed on previously published literature regarding accessibility in software and was then formed into a questionnaire (Vollenwyder et. al., 2019). This questionnaire was given to 345 web practitioners, through which three primary reasonings were found behind the lack of accessibility (Vollenwyder et. al., 2019). *User advocacy, self-perception as specialist, and product quality* where the reasonings found and were based off a misconception shared in the software community (Vollenwyder et al., 2019). Many believe that the inclusion of web accessible features creates a product that is unattractive and does not portray the sophistication that a web application deserves (Vollenwyder et al., 2019). However, quite the opposite has been proven in several studies. The inclusion of web accessibility throughout web development typically creates a product that can create "improved usability and user experience for all user groups" (Vollenwyder et al., 2019). By buying into the view that accessibility equals displeasing, it marginalizes several communities from gaining access to web content due to their abilities. It also continues to perpetuate this stigma and create a negative environment around adopting accessibility standards.

While these resources provide a shallower view of the importance of accessibility standards and implementation, an analysis of state emergency management systems shows a drastic example of the importance of accessibility standards, especially language inclusion. Benavides et. al (2020) conducted an analysis on state emergency management systems and their ability to communicate risks to non-English speaking citizens. Through this analysis, several correlations were found relating to non-English speaking citizens, employment rates, and the state governments incentive of creating a multi-lingual accessible response website. This study provides an interesting parallel to the research question I pose. While I speak on providing multilingual options as part of the accessibility standards in front-end development, this incorporation in e-government emergencies provides an alarming truth. In cases of emergency the government has adopted the internet as a form of communicating with citizens about emergency situations. A positive trending correlation was found between the number of immigrant deaths and the lack of multilingual risk communications (Benavides et al., 2020) This correlation led to a rapid development in multilingual e-government responses, but to what cost. As a result of not including language requirements as part of accessibility, lives were put at risk and even lost due to the lack of accessibility. While this is a higher risk and niche situation, this study is a prime and important example of why considering immigrants and language barriers in the view of accessibility to be important.

By enforcing the inclusion of usability viewpoints, software developers can gain greater knowledge on accessibility and software through understanding user perspective and gaining technical knowledge that can expand their portfolio. These studies support the claim on the lack of accessibility standards, but also how important it is on gaining a greater perspective. It is clear immigrants are using technology to advance their placement in the United States, but with

limited language comprehension, many digital resources are not to their disposal. Along these lines, it is important to note that several groups are affected by the lack of accessibility in web content that can range from accessing trivial information to life saving news. To comprehend the impact of language accessibility in front-end development, I will be conducting a series of interviews with Spanish speaking immigrants who live in the Northern Virginia Metropolitan Area. Through these interviews, I will be able to analyze the individual experiences of Hispanic immigrants as well as the social and policy implications that come with integrating language standards in web applications. With the literature and resources out there, the gap must be mended to further expand the concept of accessibility along with understanding its greater impact on non-English speaking U.S. immigrants.

Conclusion

While there are many teams interacting with web applications, front-end development and developers play an integral part in communicating to users. Writing code comes with other layers of implications that while not always easy to see, can affect groups in vital ways. Through the technical process described in my Technical Paper, I saw first-hand how front-end developers carefully place buttons, words, and colors to engage the user and communicate a company's image. Through the software development process, front-end developers can create an online brand for a company that will either appeal to the user when done correctly or cause a user to reject a company all together. Following, front-end developers can impact users through platform functions, and the range of accessibility features that are or are not implemented. By neglecting to acknowledge the accessibility of languages, the content and structure of the web applications now are only portrayed to specific groups of people. This minimizes the overall purpose of equal

access on the internet and shrinks the audience that could be available to the content. Whether it be through overall molding the view of an application or the how it is viewed by others, frontend development needs to consider its motives and the impacts it has on users of all groups.

References

- Benavides, A. D., Nukpezah, J., Keyes, L. M., & Soujaa, I. (2020). *Adoption of Multilingual State Emergency Management Websites: Responsiveness to the Risk Communication Needs of a Multilingual Society*. 44, 409 - 419. <https://doi.org/10.1080/01900692.2020.1728549>
- Camarota, S. A., & Zeigler, K. (2022). *Foreign-born population hit record 47 million in April 2022*. CIS.org. <https://cis.org/Report/ForeignBorn-Population-Hit-Record-47-Million-April-2022>
- Miranda, D., & Araujo, J. (2022). Studying industry practices of accessibility requirements in agile development. *SAC '22*, 1309–1317. <https://doi.org/10.1145/3477314>
- Vollenwyder, B., Iten, G. H., Bruhlmann, F., Opwis, K., & Mekler, E. D. (2019). *Salient beliefs influencing the intention to consider Web Accessibility*. 92, 352–360. <https://doi.org/10.1016/j.chb.2018.11.016>
- Lindley, C. (2019). Chapter 1. What Is a Front-end Developer? In *Front-end Developer Handbook*. <https://frontendmasters.com/guides/front-end-handbook/2019/>