



THE JOURNAL ON  
TECHNOLOGY AND  
PERSONS WITH  
DISABILITIES

# The Decentralized Education of Digital Accessibility for Technologists

Dana Frayne

Oxford Internet Institute at the University of Oxford

[Accessibility@danafrayne.com](mailto:Accessibility@danafrayne.com)

## Abstract

While research exists on the inaccessibility of the Internet, there is little discussion about the norms that are specific to digital accessibility practices in the technology industry. The aim of this research paper, derived from the author's unpublished dissertation at the University of Oxford, is to address this knowledge gap by gathering data on the norms that directly affect how digital accessibility practices are adopted in the technology industry. In particular, this research paper focuses on the educational aspect of digital accessibility by investigating how technological practitioners, particularly engineers and designers, learn about digital accessibility practices. Through a series of ten interviews with digital accessibility experts and technological practitioners, the researcher collected qualitative evidence of a decentralized educational process for engineers and designers who want to learn about digital accessibility. These findings illustrate a need for centralized educational options so that accessibility education becomes mainstream information for the next generation of technologists.

## Keywords

Digital accessibility, assistive technology, accessibility practices, academic inclusivity.

## Introduction

“The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect.” – Sir Tim Berners-Lee, 22 October 1997 (W3C)

Take a moment to consider how you used the Internet today. You may have used it to access your email account, look up an article, or even read this research paper. For the 15% of the global population that has a disability (World Health Organization, 2011), the ability to access information on the internet is often not a simple task (Goggin et al., 2019). The most frustrating aspect of this dilemma is that a plethora of assistive technology already exists for the purpose of making Internet more accessible, such as screen readers, voice-to-text software, and electronic Braille (Smith et al., 2018; Alper & Raharinirina, 2006). However, these assistive technologies only work when Internet-based products and services follow accessibility guidelines (Goggin & Newell, 2003; Cooper et al., 2012).

To address this challenge of non-conformance to digital accessibility guidelines, the aim of this research paper is to investigate the processes by which technologists are educated about digital accessibility guidelines, either through formal training or informal industry experience. A key point of clarification is that this research does not evaluate the educational materials that teach digital accessibility, but instead focuses on the processes by which technology practitioners are exposed to the practices of digital accessibility in the industry. Therefore, the aim of this research paper is to answer the question, “How is digital accessibility knowledge attained by practitioners in the technology industry?” This research question aims to bridge the burgeoning gap between digital accessibility policies and practice with this intentionally broad research question, as it allows for creative exploration of a topic that has little existing research.

## Discussion

### *Method*

This section discusses the procedures used for the semi-structured interview method. The interview method was chosen as the primary data collection practice because it has been a longstanding tradition in the social sciences that has proven to be efficient at gathering anecdotal evidence (Goldstein, 2002). The interview questions were designed to be intentionally broad, covering areas such as background in accessibility, accessibility expertise, and experiences with accessibility education. While the majority of interviews were conducted via audio or video calls, some were conducted via email, and the questions were slightly adjusted before each interview based on the field of expertise of the participant.

The criterion for inclusion in this research was that the participants must either be experts in the field of digital accessibility, with the term “expert” being subjective and applicable to multiple areas, or a technological practitioner, either through the role of an engineer or designer. The purpose for this broad selection criterion was the fact that digital accessibility is an interdisciplinary concept that covers many realms, and therefore, a narrow set of recruitment requirements would have greatly limited the research output. Furthermore, a point to draw attention to regarding recruitment is the rationale for presenting findings from a relatively small sample. While a collection of ten interviews is generally considered an unrepresentative sample in most social science research (O’Reilly & Parker, 2013), this is actually a significant number when considering the context of the broader accessibility field. This sample size represents how few accessibility experts exist in the field, which is an even smaller number when considering the obstacles related to conducting research with technologists, including non-disclosure agreements, lack of time, and lack of compensation for accessibility work. Future iterations of

this research could be improved with an expanded sample size.

To ensure the University of Oxford's ethical requirements for social science research were met, the researcher applied for and received ethical approval from the Central University Research Ethics Committee. The audio files of the calls were recorded and promptly saved to the researcher's university Nexus 365 account on the researcher's local computer. The researcher proceeded to transcribe the audio files with the assistance of the Trint transcription software. Once the initial transcription cycle was completed, the researcher uploaded the transcript into the MaxQDA data analysis software to develop a cyclical coding diagram (Saldaña, 2013).

### *Findings*

A recurrent theme in the interviews was that the educational offerings for digital accessibility are not universal nor robust, particularly in comparison to other skills offerings for designers and developers. In fact, about half of the interview participants noted that their most relevant accessibility education was gathered almost through on-the-job trainings or experience, leading to questions about the gaps that exist in the process of obtaining a digital accessibility education. The significance of obtaining an accessibility education was emphasized in a research interview with Alastair Campbell, the co-editor of the Web Content Accessibility Guidelines (WCAG) 2.1 and a digital accessibility consultant for over twenty years:

One of the biggest, biggest problems for accessibility is the education of designers and developers in general, because there's no one particular route. Whenever I run training, I start off with how many people have done any accessibility training before. The answer's usually about 10 percent...that's terrible, frankly.

This reflection, particularly coming from an accessibility expert, emphasizes the challenging reality that engineers and designers face when putting accessibility policies into practice.

Without a centralized training of the key techniques of digital accessibility, it is difficult for engineers and designers to apply digital accessibility practices to their work. These findings are divided into two primary sections: first, an overview of experiences with accessibility education at the university level, and second, a discussion of the educational offerings at the industry level.

### **Digital Accessibility Education in Universities**

These findings provide an overview of the digital accessibility educational options that are available to engineers and designers prior to entering the industry. The engineers and designers interviewed for this research obtained their discipline-specific skills in either an educational setting, such as a university or a skill-specific training course, or through on-the-job training in their profession. In a traditional university setting, the options for learning about digital accessibility are highly dependent on the university and appear to be up to the discretion of instructors of user experience design. The existence of the Teach Access grant, which provides funding grants to professors who incorporate accessibility teaching in their courses, is an example of how digital accessibility practices are incorporated into American university curriculum (Teach Access Curriculum Development Awards, 2021). A software engineer who pursued an undergraduate degree in electrical engineering and computer science noted:

One of my classes in college was a UI/UX design class that covered digital accessibility.

The class covered diversity of ability and the different kinds of impairments that might affect access to software and hardware... Additionally, the class covered current forms of assistive technology like screen readers, speech recognition, and eye trackers.

Therefore, there is evidence that digital accessibility education does exist at the university level as a subtopic of broader design courses. This sentiment was echoed by another designer who pursued a liberal arts degree and took design and computer science courses, “At my school, there

were no courses focused specifically on digital accessibility. However, accessibility was a subtopic in several of my design and computer sciences classes.”

Therefore, a trend in the research was that digital accessibility is covered as a subtopic in a user experience design class, which indicates an increased awareness about digital accessibility topics. However, there was no findings of a standalone digital accessibility course, and some practitioners indicate that they did not learn about digital accessibility until entering the technology industry. Therefore, there is evidence that digital accessibility education does exist at the university level in America, but it is highly dependent on the educational setting and appears to be at the discretion of the university professors to decide whether the topic should be included.

Before transitioning to a discussion of digital accessibility educational processes in the technology industry, a key issue to address is how digital accessibility education in a formal educational setting is often sidelined as a relatively less important topic. Accessibility scholar Gerard Goggin noted this risk of digital accessibility knowledge being limited to literature in a research interview:

There's a literature of increasing sophistication. And because of the growth of different kinds of research techniques and data gathering techniques, you can actually get really fine-grained and really sophisticated measurements of web accessibility. But it seems to me in some ways they stay in the literature.

The risk of digital accessibility information staying in the classroom and not being brought into the industry represents a significant threat to the broader digital accessibility movement, as it is critical that engineers and designers have access to knowledge of digital accessibility when they are first acquiring their technical skillset. The evidence from this research suggests a broader trend of decentralization in digital accessibility education at the university level, which poses

further questions about why digital accessibility education is not more commonplace in traditional educational systems. This question is also relevant to the next section of findings, in which there is a discussion on the options available to engineers and designers learning about digital accessibility in the technology industry.

### **Digital Accessibility Education in Industry**

This section presents an overview of the educational options available to technologists working in the technology industry. The key finding is that, similar to the educational options for technologists at the university level, the educational options at the industry level are also highly situational. Contextual factors, such as the resources of a particular technology company, are indicators of whether engineers and designers can acquire information about applying digital accessibility standards to the product development process. Larger technology companies tend to have more accessibility resources available than smaller companies, as evidenced by a designer's reflection on their experience with digital accessibility:

When I interned at large tech companies like Microsoft and Google, there were extensive internal resources on digital accessibility. Products launched needed to satisfy a number of accessibility requirements, and there were dedicated teams within these companies that were exclusively focused on accessibility.

This same designer noted that, in contrast to large technology companies, the discussions of accessibility is less prominent at mid-size and small companies, including start-ups:

Since starting my career as a full-time designer, I've worked at a mid-size startup (~150 employees) and an early startup (~20 employees). Neither of these employers have provided digital accessibility training or guidelines. Although it's acknowledged that accessibility is important, I would say that accessibility initiatives are often unfortunately

relegated as lower priority than product initiatives due to business goals.

However, this reflection does not mean that all startups and relatively smaller technology companies are unconcerned with digital accessibility education. Matthew Pierri, founder of the technology startup Sociability, emphasized his company's ongoing dedication to ensuring that their technology team was trained in digital accessibility practices:

Within this idea of translating theory into practice, it is really fundamental to engage with people's lived experience and to get them involved in a very central way in the process of designing and iterating and improving. So, not just having one disabled person at the start give some thoughts and then going off and doing whatever you want because you've got their endorsement ... [accessibility should be approached] in a very sincere and ongoing manner, rather than the all-too-common: 'we did it once, and that should be sufficient.' [Accessibility] will evolve because it's based around people, and people evolve and their preferences change.

These reflections provide a foundation of preliminary evidence to support the notion that digital accessibility educational options for technologists are highly dependent on the resources and priorities of technology companies.

A risk associated with this situational nature of accessibility education at the industry level is that there is a decentralized path to providing digital accessibility education. One possible pathway within a company is that an individual who is knowledgeable about digital accessibility advocates for increased accessibility within a team. This was identified as a common pathway in interviews, but is not sustainable in the long-term because this advocacy work is often undervalued. The other pathway identified within companies was accessibility teams, in which there are groups of accessibility experts who are both advocates and educators



within the company. In contrast to these internal resources, there are also external resources in the forms of third-party consultants and external courses that are utilized by companies to develop their accessibility educational programs. It is not uncommon for a company that is invested in ensuring the accessibility of their products to employ a variety of these resources.

Therefore, similarly to the formal educational options available prior to entering the industry, the options for digital accessibility education in the technology industry are highly situational. As identified in Figure 1, there are multiple pathways that currently exist for digital accessibility education, and it is up to companies to decide how they are going to employ these options. While companies that are proactive about adherence to digital accessibility standards can maintain long-term educational options for their employees, this decentralized educational landscape illustrates the challenges that technologists encounter when they are not formal educational systems in place to teach digital accessibility.

## **Conclusion**

Regarding the initial research question concerning how digital accessibility knowledge is attained by practitioners in the technology industry, the overarching finding is that the educational pathways for practitioners are highly dependent on situational factors. At the university level, opportunities for learning about digital accessibility skills is limited and linked to whether a professor decides to incorporate digital accessibility into their curriculum. This results in an uneven distribution of the digital accessibility skillset throughout the technologist population. Once individuals enter the technology industry, the situational context is also highly variable due to the different options that technology companies have for educating their technologists about digital accessibility. Therefore, if a company is committed to the education

of digital accessibility, then their technologists are likely to encounter multiple forms of digital accessibility trainings and educational opportunities. On the contrary, if a company is not committed to digital accessibility, the opportunities for technologists to learn about digital accessibility can be extremely limited. This decentralized educational system results in a technology industry that has a vast range of educational levels for digital accessibility skills. In order for there to be universal practices for digital accessibility, it is necessary to look at the educational options available to technological practitioners and consider how this decentralization causes inequitable backgrounds in digital accessibility.

The thesis from which this research is based on addressed additional norms of digital accessibility, including digital accessibility policies and social norms in the industry. The research presented in this paper is meant to serve as a preliminary starting point for further investigations into the educational landscape for technologists learning about digital accessibility. This research could be improved with an expanded sample size, as well as a more detailed emphasis on sectors of digital accessibility education. Future research can build upon these findings by studying the education of digital accessibility in countries other than the United States, as well as specific industry sectors that present significant challenges to digital accessibility, such as artificial intelligence.

These findings investigate the educational norms that operate within the field of digital accessibility with an emphasis on how technologists learn about digital accessibility at the university and industry levels. Through a series of interviews with digital accessibility experts and practitioners, this research highlights the pressing need for a centralized educational pathway for technologists learning about digital accessibility. A departure from the decentralized educational system that results in this uneven landscape will improve outcomes for people who

utilize assistive technology, as well as the technologists who are building these products. This overview of the existing educational system is meant to present a starting point for further research on how technologists can be better prepared to build products that can be used by anyone, regardless of ability. By developing a more equitable educational system through the process of centralization, it is more likely that the goal of universal adherence to digital accessibility standards will become attainable for the broader technology industry.

### Works Cited

- Alper, Sandra, and Sahoby Raharinirina. "Assistive Technology for Individuals with Disabilities: A Review and Synthesis of the Literature." *Journal of Special Education Technology*, vol. 21, no. 2, Mar. 2006, pp. 47–64, doi:10.1177/016264340602100204.
- Cooper, Martyn, et al. "A Challenge to Web Accessibility Metrics and Guidelines: Putting People and Processes First." *Proceedings of the International Cross-Disciplinary Conference on Web Accessibility*, Association for Computing Machinery, 2012, doi.org/10.1145/2207016.2207028.
- Goggin, Gerard, et al. "Disability at the Centre of Digital Inclusion: Assessing a New Moment in Technology and Rights." *Communication Research and Practice*, vol. 5, no. 3, Routledge, July 2019, pp. 290–303, doi.org/10.1080/22041451.2019.1641061.
- Goggin, Gerard, and Christopher Newell. *Digital disability: The social construction of disability in new media*. Rowman & Littlefield, 2003.
- Goldstein, Kenneth. "Getting in the Door: Sampling and Completing Elite Interviews." *PS: Political Science & Politics* 35, 2002, pp. 669 - 672.
- Hammersley, Martyn. "Assessing the Radical Critique of Interviews." *Questioning Qualitative Inquiry*. London: SAGE Publications, Ltd, 2008, pp. 89-100. *SAGE Research Methods*, doi.org/10.4135/9780857024565.
- O'Reilly, Michelle, and Nicola Parker. "'Unsatisfactory Saturation': A Critical Exploration of the Notion of Saturated Sample Sizes in Qualitative Research." *Qualitative Research*, vol. 13, no. 2, Apr. 2013, pp. 190–197, doi:10.1177/1468794112446106.
- Saldaña, Johnny. "The Coding Manual for Qualitative Researchers", *SAGE Publications*, vol. 2, 2013.

Smith, Roger O et al. “Assistive technology products: a position paper from the first global research, innovation, and education on assistive technology (GREAT) summit.”

*Disability and rehabilitation. Assistive technology* vol. 13,5 (2018): 473-485,

doi:10.1080/17483107.2018.1473895.

“Teach Access Curriculum Development Awards.” *Teach Access*, 2021, Accessed 13 September 2021. <https://teachaccess.org/initiatives/faculty-grants/>.

World Health Organization. *World report on disability*. 14 December 2011,

[www.who.int/publications/i/item/9789241564182](http://www.who.int/publications/i/item/9789241564182). Accessed 10 September 2020.

World Health Organization.

World Wide Web Consortium (W3C). “World Wide Web Consortium

launches international program office for Web Accessibility Initiative: Government, industry, research and disability organizations join forces to promote accessibility of the web.” 22 October 1997, [www.w3.org/Press/IPO-announce](http://www.w3.org/Press/IPO-announce). Accessed 20 September

2020. Press Release.