ACCESSIBILITY AND SOCIAL RESPONSIBILITY:
EXPLORING BARRIERS TO ACCESS ON NEWS WEBSITES
FOR PEOPLE WHO ARE d/DEAF OR HARD OF HEARING

A Thesis
presented to
the Faculty of the Graduate School
at the University of Missouri-Columbia

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
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DECEMBER 2017

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ACKNOWLEDGEMENTS

Many people have guided and supported me through this process. My deepest thanks to:

Emily Stewart and Charlie Triplett, who changed the course of my life by introducing me to the concepts of web accessibility and universal design.

Dr. Erin Dannecker, Jason Rollins, Carmen Schafer, Abbie O’Sullivan, Angela Branson and the many faculty and staff at MU who patiently offered their time and expertise.

Everyone who participated in this study and freely shared their thoughts, feelings and experiences with me.

My former co-workers at Mizzou Creative, who were always so encouraging and enthusiastic about this research.

My wise thesis adviser, Keith Greenwood for giving me a strong foundation for doing qualitative research and for his incredibly thoughtful feedback through many revisions.

My committee members, Allison Kabel, Judd Slivka and Ryan Thomas, for their support, ideas, and feedback.

My family, for giving me the motivation I needed to finish my degree, even when balancing it along with work, school, moving houses, changing jobs and planning a wedding sometimes seemed impossible. Special thanks to Ry Colman, Cathy Hughes, Greg Colman, Suzanne Fisher, and Tootie.

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ABSTRACT

The purpose of this research is to identify barriers to accessing online news for people who are d/Deaf or hard of hearing. Drawing from social responsibility theory, this research also seeks to understand the idea that media should provide content that allows citizens to be informed by exploring how participants believe accessibility barriers on news websites affect their ability to consume news.

Looking to critical disability theory, which emphasizes seeking input from oppressed groups about their own oppression, the study used observation and semi-structured interviews with nine mid-Missouri residents who have hearing loss. Common barriers were identified, including a lack of text alternatives accompanying videos, insufficient captions, unlabeled content, auto-playing videos, background noise and issues with volume. The degree to which these barriers affected respondents depended on the severity and type of their hearing loss.

Findings suggest barriers encountered affect the ability of people who are d/Deaf or hard of hearing to access news, and that they might not be fully aware of how or how much it affects them. These findings point to the idea that media should more directly consider the needs of people who are d/Deaf or hard of hearing when developing news websites and web content, by seeking to understand the many ways in which hearing loss can affect website usability.

Chapter 1: Introduction

Americans are accessing news online more than ever before (American Press Institute, 2014), with one in four in the people in the U.S. getting news online in 2016 (Pew Research Center, 2016). People in the U.S. are now more likely to use a digital device rather than television to access news about topics such as science, technology, health, art, culture and lifestyle topics (American Press Institute, 2014). More than a third of U.S. adults watched news videos online in 2012 (Pew Research Center, 2012). In 2016, 46 percent of U.S. adults preferred to watch news rather than read it (35 percent) or listen to it (17 percent) (Pew Research Center, 2016).

Although video and multimedia are featured prominently on news sites, accessing them can be a challenge for people with hearing impairments. A 2011 study estimated that in the United States nearly one in five people 12 years or older has either unilateral (affecting one ear) or bilateral (affecting both ears) hearing loss (Lin, Niparko & Ferrucci, 2011). And yet, the limited research that has been done on the accessibility of online news shows that both local and national news outlets have inaccessible web content and that news organizations are failing to address basic “low-hanging fruit” accessibility barriers (Stewart, 2014, p. 56).

This study will focus specifically on individuals who are d/Deaf or hard of hearing. There is an important difference between lowercase “deaf” and uppercase “Deaf,” as explained by Padden and Humphries (1988): “We use the lowercase *deaf* when referring to the audiological condition of not hearing, and the uppercase *Deaf* when referring to a particular group of deaf people who share a language — American Sign Language (ASL)

— and a culture” (p. 2). The lowercase “deaf” can also refer to someone who lost some or all of their hearing later in life and does not identify with Deaf community or culture as their primary experience (Ladd, 2003). Hearing loss can be mild, moderate or profound (deafness) (WebAIM: Types of Auditory Disabilities, 2013). Sometimes, people with hearing loss will use assistive devices such as hearing aids, which amplify sounds, or cochlear implants, which stimulate the auditory nerve to give someone with more severe hearing loss a sense of sound (National Institute on Deafness and Other Communication Disorders, 2017).

On the web, users should be able to perceive information with at least one of their senses (i.e. sight or hearing) (Peters & Bradbard, 2010). However, for people with hearing loss, there can be barriers that prevent or hinder them from perceiving content. For example, if people who are d/Deaf or hard of hearing can’t perceive audio, they will have difficulty consuming audio-only content. Offering the audio content in an alternative text format, such as a transcript, would provide another option by which someone could perceive the content (WebAIM: Types of Auditory Disabilities, 2013). For many videos, perceiving the information presented requires knowing what the audio is conveying. If the audio portion of a video isn’t perceivable for someone, they could have an incomplete understanding of the information. Alternative text such as captions would help make the audio perceivable in another way.

Because this study focuses on access to news, it’s important to discuss the role of news organizations in web accessibility. Journalism is fundamental to democracy because it provides access to common language and knowledge and helps create a free and open marketplace of ideas (Kovach and Rosenstiel, 2014; Davis, 2003; Stewart, 2014). The

Commission on the Freedom of the Press outlined specific requirements for the responsibilities of the press to society, including “full access to the day’s intelligence” (Siebert et al., 1963, p. 91). One of the functions of the press outlined under social responsibility theory is “enlightening the public so as to make it capable of self-government” (Siebert, Peterson & Schramm, 1963, p. 74). Peterson wrote that as the idea of social responsibility of the press evolved, members of the media “contended that the public has a right of access to information, had a basic right to be informed, and that the press was the agent of the public in breaking down barriers to the free flow of news” (1963, p. 91). If citizens with disabilities can’t fully access news and information, they will arguably be at a disadvantage to participate in society. The responsibility of the press to serve the public is not a new concept. As technology presents new ways to provide information to the masses, media organizations should adapt to the current environment if they want to act socially responsibly.

This research seeks to identify barriers to accessing online news for people with hearing loss and explore the degree to which d/Dhh users think the barriers affect their ability to be informed citizens. During this research, looking to this population for guidance about their own needs and preferences was crucial, taking into account critical disability theory, derived from critical theory (Adam & Kreps, 2009). Critical disability theory suggests that the key to the emancipation of oppressed groups is to consult the groups themselves rather than people of privilege attempting to solve the groups’ problems without input (Adam & Kreps, 2009). By looking to d/Dhh individuals to better understand their needs on the web and the barriers they encounter, the field of journalism and mass

media could be better positioned to serve users with disabilities and fulfill their responsibility to provide a free flow of information to all citizens.

It's important to note the controversy around whether deafness is a disability because many people who identify as Deaf do not consider it to be one (Paul, 2015). Historically, the term is only tolerated because it's attached to concepts of access and civil rights (Padden & Humphries, 1988), despite the fact that many in the Deaf community choose to view deafness as a unique attribute such as hair color or height (McKee, Schlehofer, and Thew, 2013). The researcher recognizes that "disability" is not a term many people in the Deaf community primarily identify with and will use "d/Deaf or hard of hearing" or "d/Dhh individuals" as primary identifiers, using the term "disability" only when discussing the concepts of disability and social exclusion.

The following chapters will set the foundation and method of the study before reporting results. Chapter 2 will outline critical disability theory as well as social responsibility of the press. The chapter will examine relevant literature to both theory areas as well as research related to web accessibility and will draw on the theory and research to propose specific research questions. Chapter 3 will explain the methodology used for this study, including sampling methods, data collection, how data was analyzed and the steps taken to ensure validity and reliability. Chapter 4 will discuss the study's findings as they relate to the research questions, outlining the barriers participants encountered and discussed during interviews and observation as well as the degree to which participants felt they were informed. Chapter 5 is a discussion of the findings, and, given the findings, it includes reasons the media might be motivated to prioritize accessible web content for

d/Dhh users and the potential benefits media organizations could experience in doing so.

The discussion will also cover limitations of the study and areas for further research.

Chapter 2: Literature Review

Critical Disability Theory

Disability studies are truly multidisciplinary, and they reach across social sciences, applied sciences and medicine, with research on accessibility barriers in areas such as education, employment, transportation and many others (Meekosha & Shuttleworth, 2009; Reaume, 2014). In the area of web accessibility, Pascual et al. (2015) define the term “barrier” as “any condition that makes it difficult for people with disabilities or special needs to achieve a goal while they are browsing a website, even if they use the appropriate assistive technology” (p. 234).

Critical disability studies emerged from 1970s disability activism (Reaume, 2014) to become “a social, political and intellectual re-evaluation of explanatory paradigms used to understand the lived experience of disabled people and potential ways forward for social, political and economic change” (Meekosha & Shuttleworth, 2009). This approach counters previous models including the charity and medical models of disability, which Adam & Kreps (2006) argue masked the “lived experience of disability” (2006, p. 204). These models view disability as a problem, misfortune or tragedy individuals face because their bodies are “wrong” (Clare, 2001, p. 360).

The charity model operates around the goal of reducing or “curing” disabilities as conditions through generous giving (Clare, 2001), providing services to people who have disabilities without truly understanding the underlying reasons for their social exclusion (Reaume, 2014). Clare (2001) uses the example of Jerry Lewis and his annual Labor Day telethon to raise money for the Muscular Dystrophy Association (MDA): “He raises money

by playing to pity and promising to find a cure. This money does not fund wheelchairs, ramps, or lift bars, nor lawyers to file disability discrimination lawsuits, but research for a cure, for a repair of bodies seen as broken, for an end to disability” (p. 360). Rather, Clare (2001) argues, it is ableism that needs to be addressed, including factors such as the oppression of people with disabilities, barriers to access, substandard education and lower rates of employment.

The medical model treats deafness as a medical diagnosis and measures hearing impairment according to how severe hearing loss is. For example, a person who only hears sounds louder than 21 to 40 decibels (dB) would be considered to have mild hearing loss, a person who can hear sounds louder than 40 to 69 dB would be considered to have moderate hearing loss, someone who can only hear sounds above 71 to 90 dB would be considered to have severe hearing loss, and someone with profound hearing loss (deafness) would not be able to hear sounds below 90 dB (Pascual, Ribera & Granollers, 2015). The medical model of disability focuses on impairment as a loss belonging to the individual, where any deficiency or discrepancy because of that loss is seen as attributed to the person (Adam & Kreps, 2006). Essentially, if someone is deaf, it would be their deafness that causes them to encounter barriers rather than “the material and social conditions of ableism” (Clare, 2001, p. 360). If someone in a wheelchair encountered stairs, the medical model would attribute that barrier to their need for a wheelchair rather than the lack of a ramp or elevator (Clare, 2001). In the same way, the medical model might attribute the inability to understand video content to someone’s deafness rather than a lack of text alternative such as captions accompanying the video.

Influenced by critical theory, critical disability theory is a framework for studying issues related to disability that pushes for an account of lived experiences of oppression from the people who lived those experiences, rather than looking at those experiences from the top down (Hosking, 2008; Adam & Kreps, 2006; Devlin & Pothier, 2006). At its core, critical theory is about questioning power dynamics, and it intends to explain oppression in order to move society toward human emancipation (Meekosha & Shuttleworth, 2009; Hosking, 2008). Critical theory argues that researchers should take knowledge from oppressed groups seriously and consider it equal to knowledge from other, perhaps more dominant or privileged, groups (Adam & Kreps, 2006). Forms of critical theory have developed in other areas, including queer theory, some forms of feminism, and critical race theory (Devlin & Pothier, 2006).

Critical disability theory adopts a version of the social model of disability studies, which posits that disability is a social construct, a “complex interrelationship between impairment, individual response to impairment, and the social environment,” and that people with disabilities experience social disadvantage because their environment fails to meet their needs as people who don’t fit certain social expectations of what it means to be “normal” (Hosking, 2008, p. 7). The social model contrasts the medical model and focuses instead on self-identification, seeing disability as a product of the surrounding environment rather than a loss or discrepancy belonging to the individual (Adam & Kreps, 2006). Essentially, if someone is deaf, it would be their environment that creates barriers. With this model, the medical severity of hearing loss is less important, and what matters is that someone identifies as part of the Deaf (with a capital D) community (Möbus, 2010). Rather than identifying as having a medical condition, people who are Deaf identify as part of a

minority community that shares a preferred language (sign language), as well as culture, traditions, and behavior (Möbus, 2010).

Asch (2001) suggests that we think of disability in terms of human variation, and that humans have varying physical and mental attributes and that disability is merely an extension of those attributes. Further, Asch proposes that the problems people with disabilities experience are not a result of their being disabled, they are a result of the failure of social institutions to deal with that wider set of variations in a population. This model of human variation, Asch argues, “removes some of the pejorative ‘specialness’ and ‘exceptionality’” reminding us that humans come in many different physical, mental and emotional forms (Asch, 2001, p. 400). The model, Asch says, gets rid of the “us and them” mentality (Asch, 2001).

To better understand how news websites address human variation, critical disability theory will guide the methodology, as the model places importance on the idea of asking people with disabilities about their own lived experiences and looking to those experiences for guidance. Tools to automatically detect accessibility barriers exist, but they are limited, often needing humans to interpret problems and the severity of those barriers (Crespo, Espada & Burgos, 2016). For example, in the case of text alternatives, an accessibility checker tool might be able to identify that captions or transcripts exist but would be unable to interpret whether the caption or transcript text was understandable or fully useful to the people who needed them (Lewthwaite, 2014). Lewthwaite (2014) recommends a critical approach because it provides much-needed context, allowing research to make strides that are more sustainable and culturally relevant than they would be with automated tools, which evaluate barriers out of context. By exploring experiences, thoughts, and attitudes

through qualitative research, this study can provide better understanding around how accessibility barriers on news sites affect people who are d/Deaf or hard of hearing.

Social Responsibility Theory

The key premise of social responsibility theory is that with freedom comes obligations and that the press, which has a position of relative privilege under the government, is obligated to perform certain responsibilities and duties for the public (Siebert et al., p. 74). Social responsibility theory was created to supplement libertarian theory, which didn't provide any direction on the public's right to information or outline the moral responsibilities of publishers (Siebert et al., p. 73). For historical context, keep in mind that the U.S. Constitution was framed by children of the Enlightenment, who saw government and the press as adversaries and believed that a free press "could serve as a guardian against governmental encroachments on individual liberty" (Siebert et al., 1963, p. 76). They thought that men would seek truth above all else and be able to separate the true from the false. However, in practice, these ideals proved to a bit too optimistic, as individuals were still capable of distortion and deceit (Siebert et al., 1963).

As the Industrial Revolution took hold, technological developments allowed the press to grow into a mammoth, and politics and the press became more institutionalized (Christians, 2009). Americans began criticizing the press, focusing especially on unrestrained power of big newspaper tycoons and a tendency to sensationalize news, which compromised the flow of public information (Siebert et al., 1963; Christians, 2009). By the mid-twentieth century, the conversation had shifted from focusing on the rights of the press to discussing the rights of the public (Christians, 2009). Publishers began tying

responsibility and freedom together, formulating ethical codes and taking more of an interest in serving the public good (Siebert et al., 1963).

During World War II, a commission emerged with the goal of investigating the appropriate functions of the media in twentieth-century democracy (Nerone, 1995). Formed by *Time and Life* magazine publisher Henry Luce and his Yale classmate Robert Maynard Hutchins, president of the University of Chicago, the group was called the Commission on the Freedom of the Press, also known as the Hutchins Commission (1995). After four years of deliberation, during which the commission interviewed important members of the media, government, and academia, the group delivered its final report in 1947 (1995). The report touched on several responsibilities of the press in a democratic society where the press had a relatively privileged social position: “providing a full and reliable account of daily events; separating fact from comment; providing a forum for the exchange of comment and criticism; and providing a representative picture of the society” (Christians, 2009, p. 121).

The Hutchins Commission listed five requirements for press in contemporary society: first, to provide “a truthful, comprehensive, and intelligent account of the day's events in a context which gives them meaning; second, a forum for the exchange of comment and criticism; third, a means of projecting the opinions and attitudes of the groups in the society to one another; fourth, a method of presenting and clarifying the goals and values of the society; and, fifth, a way of reaching every member of the society by the currents of information, thought, and feeling which the press supplies” (Commission on the Freedom of the Press, 1947, p. 20). The fifth requirement is particularly important with regard to issues of access to news and the public’s ability to obtain information. It obligates

the press to provide “full access to the day’s intelligence” (1947, p. 28). The commission argued that in order to make rational decisions and perform their functions in a democratic society, people in a society need to have access to objective information (1947). As Kovach and Rosenstiel (2014) note, “the primary purpose of journalism is to provide citizens with the information they need to be free and self-governing” (p. 17). They argue that because news — everyday information such as whether it will rain tomorrow or what the president said last night — is how people learn about the world, and that it must be usable and reliable (Kovach and Rosenstiel, 2014). If certain groups or members of the public can’t adequately access that news as other groups can, they risk being disenfranchised.

The commission also acknowledged the sheer amount of information society needed in “a modern industrial society” (1947, p. 28). When the Hutchins Commission created this report, its members could not fathom today’s digital media landscape and both the amount and speed of information society experiences in the modern age. Despite this, their arguments are still applicable today, although threats to access look much different. After more than two decades of development of the Internet, much of the web remains inaccessible to people with disabilities despite the creation and strengthening of international web accessibility standards as well as discrimination legislation in many Western countries (Adam & Kreps, 2006). Many major news organizations have failed to provide even some of the most basic accessibility accommodations on their websites, such as meaningful alternative text, or text that web developers add to describe images for people using screen readers (Stewart, 2014). Considering the number of Americans who have a disability — one in five (U.S. Census Bureau, 2012) — the accessibility of online news is an important issue to investigate. Social responsibility theory provides a foundation

to justify this research because it could be argued that if news organizations wish to act socially responsibly, they would need to accommodate for people with disabilities on their websites.

Web Accessibility

Studies have explored web accessibility on many different types of websites, analyzing the impact of accessibility barriers on websites in the private sector (Leitner, Strauss, & Stummer, 2016; Gonçalves, Martins, Pereira, Oliveira, & Ferreira, 2013; García & Diaz, 2010), including how web accessibility can be used in marketing strategy related to corporate social responsibility (Peters & Bradbard, 2007). Researchers have also explored the accessibility of websites in higher education (Hackett & Parmanto, 2005; Thompson, Comden, Ferguson, Burgstahler, & Moore, 2013), library websites (Providenti & Zai, 2007; Comeaux & Schmetzke, 2013; Maatta Smith, 2014) and government websites (Yu & Parmanto, 2011; Olalere & Lazar, 2011). Only in the past several years have researchers started to explore accessibility of news websites (Henquinet, 2014; Stewart, 2014; Youngblood & Lysaght, 2015), and there is a gap in research on accessibility barriers that specifically affect d/Dhh individuals, as well as a gap in research that looks at how those barriers in news websites affect how informed users perceive themselves to be . Shiver and Wolfe (2015) studied d/Deaf individuals and access to multimedia content and found that access to online news was a common source of concern for participants, although the study did not explore the range of barriers participants encountered or the degree to which those barriers affected them.

Researchers also have yet to use social responsibility theory specifically as an argument for more accessible news websites. Studies have, however, explored accessibility

in the context of the ethical and moral implications of web accessibility. Peters and Bradbard (2010), argue that companies might place a focus on web accessibility to avoid being labeled “irresponsible” by customers. Peters and Bradbard analyzed the ethical implications of web accessibility, using a questionnaire to gather the opinions of web designers, and found that the majority viewed accessibility through the lens of contractarianism, a view of ethics that assumes people are all entitled to the same basic rights. Essentially, they believed that accessibility was worth working toward because all prospective users deserved access to content (Peters and Bradbard, 2010).

Being d/Deaf or hard of hearing does not stop people from wanting or needing to use the Internet. In a national survey of people who are d/Deaf or hard of hearing, 74.5 percent of participants reported frequent use of the Internet, with regular use of smartphones (71.6 percent) and personal computers (70.9 percent) (Maiorana-Basas & Pagliaro, 2014). But people who are d/Deaf or hard of hearing can encounter a range of barriers online, most often due to the inability to perceive acoustics. Pascual et al. (2015) noted that when it comes to web accessibility, developers, and content authors tend to focus on the Web Content Accessibility Guidelines (WCAG) 2.0 statement that web content should be perceivable — that it isn't invisible to their senses (W3C, 2008) — but they can forget that content should also be understandable, operable and robust (Pascual et al., 2015). Without all four of these principles, content will not be accessible, according to WCAG 2.0 (W3C, 2008).

WCAG 2.0 guidelines already outline types and characteristics of web content that could act as a barrier for someone who is d/Deaf or hard of hearing, with “success criteria” to advise web developers on how to avoid or fix issues. For example, guideline 1.2 states

that web developers should “provide alternatives for time-based media” (“Time-based media,” 2017) with one of the success criteria for meeting this guideline being to provide captions for time-based, pre-recorded media. Success Criterion 1.2.2 states that captions should be “provided for all prerecorded audio content in synchronized media” (“Captions (Prerecorded),” 2017). In short, pre-recorded videos with synchronized audio should have captions or, if there is no audio, should include “a note saying ‘no sound is used in this clip’” (“Captions (Prerecorded),” 2017). The desire for text alternatives was also recorded in the national survey of people who are d/Deaf or hard of hearing, with 41.4 percent of survey participants saying that they wanted websites to have captions or captioning options (Maiorana-Basas & Pagliaro, 2014). Maiorana-Basas and Pagliaro (2014) suggested that such a large desire for captions could indicate that current caption offerings are insufficient, keeping people who are deaf or hard of hearing from fully participating or engaging with online audio or video content.

WCAG 2.0 also provides information about what makes captions successful. One way to fail Success Criterion 1.2.2 is for caption text not to be equivalent. WCAG states, “if the ‘caption’ does not include all of the dialogue (either verbatim or in essence) as well as all important sounds then the ‘captions’ are not real captions” (“Time-based Media,” 2017). To be equivalent, captions should be “(1) synchronized and appear at approximately the same time as the audio is delivered, (2) equivalent and equal in content to that of the audio, including speaker identification and sound effects; and (3) accessible and readily available to those who need or want them” (“Quality Captioning,” 2017). Additionally, there are five elements of quality captioning, according to The Described and Captioned

Media Program: errorless, consistent, clear, readable and equal. An example of this could be an audio recording of a press conference:

A Web page includes a link to an audio recording of a press conference that identifies the audio recording. The page also links to a text transcript of the press conference. The transcript includes a verbatim record of everything the speakers say. It identifies who is speaking as well as noting other significant sounds that are part of the recording, such as applause, laughter, questions from the audience, and so on (W3C, 2016, n.p.). If the transcript was paraphrased rather than verbatim, or if it didn't include significant sounds in the recording such as laughter, the user would be able to perceive text, but they wouldn't be in a position to gain a full understanding of the content, as someone who was able to perceive the audio could.

WCAG 2.0 Success Criterion 1.4.7 addresses background noise, stating that pre-recorded audio-only content that contains primarily speech in the foreground should have low or no background noise “to ensure that any non-speech sounds are low enough that a user who is hard of hearing can separate the speech from background sounds or other noise foreground speech content” (“Low or No Background Audio,” 2017). Related to this, WCAG 2.0 also addresses auto-playing content with guideline 1.4.2, which discourages sounds that start automatically and instead allowing users to control the start and stop of audio content once they land on a page. (“Audio Control,” 2017). When auto-playing content overlaps with other audio that's playing, this has the potential to affect people who are hard of hearing.

Effective solutions to address the inability to perceive acoustics include providing text alternatives such as captions and transcripts for multimedia, or for video to be

accompanied by sign language captions (Pascual et al, 2015). Another option is using automatic speech recognition (ASR) to generate captions automatically, which is a potentially lower-cost but much less reliable method for text generation (Shiver & Wolfe, 2015; Ellcessor, 2012). Shiver and Wolfe (2015) interviewed and observed 20 participants who were d/Deaf or hard of hearing to identify issues that caused the most frustration as well as priorities for deaf accessibility improvement. The researchers found that captions generated by ASR were no more effective in helping participants understand content than if there were no captions at all.

Thanks to WCAG 2.0, information on what barriers to avoid and how to fix or address barriers is freely available to web developers and content creators, however, web accessibility practices aren't widely apparent in the news industry. Several studies have found that news websites, both local and national, have failed to make website content consistently accessible to people with disabilities, including auditory disabilities (Stewart, 2014; Youngblood & Lysaght, 2015; Henquinet, 2014). Youngblood and Lysaght (2015) examined 131 local television news websites and found that only 60 percent of stations with videos on their websites included captions, and for those that did, there were issues with inconsistency, as many sites that did have captions for videos did not have them for all videos. Major news organizations have also been shown to have inaccessible web content (Henquinet, 2014; Stewart, 2014). A study by Henquinet (2014) found a number of barriers on news websites affecting access for people who have visual disabilities, including confusing and complex layouts, clutter and improperly labeled elements such as buttons and photos. Stewart (2014) analyzed five major U.S. news websites: CNN.com, FOXNews.com, NBCNews.com, NYTimes.com and USAToday.com, using WCAG 2.0

as the criteria for analysis. Stewart found that as of March 2014, all five sites failed to meet basic web accessibility accommodations, including providing text alternatives such as transcripts and captions. It's unlikely these failures are due to technology not being advanced enough, Stewart explained: Assistive technology has advanced to the point where the journalism industry's implementation has become the barrier to consumption. For example, Apple's iOS devices have a built-in screen reader and AssistiveTouch for those who rely on motor accommodations. Despite other disciplines embracing accessibility for years, little to no discourse in the news industry exists (2014, p. 56).

When web designers focus on reducing and removing barriers for people with disabilities, they very often end up creating products that are more user-friendly for everyone (W3C, 2008). Other audiences stand to benefit from news organizations addressing web accessibility barriers, including older users — because vision, hearing and cognitive disabilities tend to decline as people age — as well as users with low-bandwidth connections and non-native speakers (Thatcher, 2006). For people with low-bandwidth connections, text alternatives for multimedia can allow users to access and understand content even if multimedia files won't load (Thatcher, 2006). Captioning technology now allows for interactive video transcripts, which let users click anywhere within transcript text and be taken to that point in the video where text is being spoken (Zdenek, 2011). It's also possible on some sites for users to listen to a video in one language but pull up captions for the video in another language (Zdenek, 2011), which could aid with language learning for non-native speakers.

Another example of accessibility accommodations benefiting other users can be seen on Facebook. Facebook videos play automatically without sound when users scroll

over them, and media publishers have reported that up to 85% of Facebook videos are watched with no sound. (Facebook, 2013; Patel, 2016). Because of this, marketers have adjusted their video strategy to make content consumable even without sound by adding text overlays or captions (Shields, 2015). Not only can the addition of text or captions benefit people with hearing loss who rely on text alternatives, it can also benefit anyone who can't or does not wish to turn on sound.

More robust captioning technology is also contributing to richer online experiences for all users (Zdenek, 2011). Search engine optimization improves when audio and video content have text alternatives. Search engines rely on metadata to retrieve information about images, videos and audio files (Ellcessor, 2012). If videos have captions or transcripts, that text can act as metadata, making multimedia content more findable to all users on the web (Ellcessor, 2012).

Research Questions

Based on these theories and prior research, this study asks the following research questions:

- What barriers to online news consumption do people who are d/Deaf or hard of hearing encounter?
- To what degree do people who are d/Deaf or hard of hearing believe accessibility barriers on news sites affect their ability to be informed citizens?

Chapter 3: Methodology

Because of the gap in research on accessibility barriers in news websites and how they affect d/Dhh individuals, this qualitative study explored the accessibility barriers on news websites encountered by people who are d/Deaf or hard of hearing and how they perceive the impact of those barriers. First, observation of participants using personal computers or devices to access news online was conducted with nine adults in mid-Missouri who are d/Deaf or hard of hearing. Next, face-to-face semi-structured interviews were conducted. Observation was used to give the researcher a better understanding of the specific barriers participants encounter and to see firsthand how they react when they encounter barriers on news websites. Witnessing these interactions provided more specific and reliable data than simply asking participants to recall what they do or how they feel when they encounter a barrier in their daily lives. The semi-structured interviews that followed allowed the researcher to collect detailed information about participants' experiences in a more conversational manner (Harrell et al., 2009). The flexibility of semi-structured interviews allows the researcher to understand the meaning of "information, opinions and interests in each respondent's life" rather than merely collecting data, which can lead to the generalization of human behavior, according to Brennan (2013).

Other studies have successfully used semi-structured interviews and observation with d/Dhh individuals to examine the effects of electronic communication barriers, usability, and web accessibility concerns, including Rutgersson and Arvola (2007), who used semi-structured interviews to study user interfaces for people with deaf blindness; Henderson, Grinter and Starner (2005), who used semi-structured interviews to explore d/Deaf teenagers' use of electronic communication; and Pascual et al. (2015), who

observed participants with hearing impairments to study the impact of web accessibility barriers on mood.

Sampling

Inclusion criteria were that participants be at least 18 years old, have a diagnosis of or identify as d/Deaf or having any degree of hearing loss and access news online regularly. To recruit participants, organizations that work with people who are d/Deaf or hard of hearing were contacted, including the Mid-Missouri School for the Deaf, the Missouri Association for the Deaf, the Missouri Commission for the Deaf and Hard of Hearing, the Leadership through Education & Advocacy for the Deaf (L.E.A.D.) Institute, the University of Missouri Disability Center and the University of Missouri Adaptive Computing Technology (ACT) center. Although some organizations were responsive, these communications did not result in the recruitment of any participants. Another recruitment tactic used was an ad placement in a weekly university email newsletter asking for participants, and the posting received 10 responses from interested participants. Nine participants were included in the study, as one participant, during the interview, revealed he did not get any news online and avoided the Internet. No sign language interpreters were requested, but accommodations were available if participants desired them.

Participants ranged in age, sex and degree of hearing loss. Seven participants were middle-aged or older adults who ranged in age from mid-40s to mid-60s, and two participants were in their early 20s. Degree of hearing loss for participants range from mild to profoundly deaf, though the majority of participants described themselves as having mild to moderate hearing loss. Only one participant was profoundly deaf, and she had a cochlear implant. There wasn't much variation in degree of education: most participants

were college-educated or taking college courses. Additionally, all participants were white. Geographic limitations of this study meant that participants were all from mid-Missouri. Table 1 includes a list and description of participants.

Data Collection

During observation and interview sessions, participants were asked to visit three different websites: two chosen at random from a predefined list using a random choice generator tool and one website of the participant's choice. The predefined websites included one legacy media website — either cbsnews.com, abcnews.com or nbcnews.com — and one new media website — buzzfeed.com/news, huffingtonpost.com or thehill.com.

Participants completed a set of tasks on each website based on tasks used by Aizpurua, Arrue and Vigo (2015) to study web accessibility and user expectations. For each website, participants were asked to (1) freely navigate on the website to become familiar with it (2) find a piece of news to consume that includes a video component, and (3) read, watch or engage with the piece of news. The tasks were intentionally vague, according to Aizpurua et al. (2015) to trigger “real world situations where users have an informational goal in mind but explicit directions to accomplish are absent” (p. 155). Participants were told to take as much or as little time as they needed to perform each task. The researcher observed how participants found and navigated to content, how they consumed video content and any adjustments they made while the video was playing, such as having to stop or reload the video. Additionally, the researcher paid attention to any comments participants made about the websites. The observation portion was also a chance for participants to get in the mindset of looking at news online to prepare them for the interview.

When the observation portion was finished, participants were asked a series of questions during a semi-structured interview. Although the researcher had a list of predetermined questions to guide the interview, the order and number of questions asked in each interview varied depending on the participant's responses.

Questions from the researcher's interview guide included:

- Do you get news online? Which news websites do you use and why?
- Do you prefer to get news in a specific medium: text, video or audio?
- What news websites do you visit that do an especially good job of providing news content you can access?
- What are some of the biggest frustrations you face in accessing news on the Internet? What contributes to those frustrations?
- Are there news websites you avoid because they're not accessible enough? What can those websites do better to make you use them?
- Do you feel that you have adequate access to local news? What about national news or international news?
- Is there anything we didn't cover that you want to talk about?

Interviews with participants included discussion about the nature of each participant's hearing loss, allowing them to share whatever details about their hearing loss they wished, as well as talking about certain adjustments they make or accommodations they use. Questions about hearing loss were intentionally broad and open and avoided referring to hearing loss as a medical condition, which Möbus (2010) indicated might not be how someone who is d/Deaf or hard of hearing wants to identify.

Participants were given the option to meet in the location of their choice or in the researcher's office in an effort to make participants feel more comfortable and at ease and maintain the use of natural settings, a common characteristic of qualitative research (Creswell, 2013). Most sessions took place in the researcher's office, but a few took place in other locations, including one participant's home, one participant's office, and one library study room. All observation took place when participants were using a desktop

computer or personal laptop computer to visit websites. Following techniques used by Louise Roberts and Fels (2006), both interviews and observation were video recorded, with a recorder aimed at the computer screen. Audio was also recorded to better capture dialogue and as a backup in case the video recorder failed. Additionally, the researcher took notes during and after the interviews and observation.

Analysis

Interviews were transcribed, coded and analyzed according to Glaser and Strauss's (1967) constant comparative method of qualitative research, which is an iterative process of reducing data by using comparison at each stage of the process. This method was chosen for this research because it allows for flexibility and "requires only saturation of data — not consideration of all available data" (Glaser & Strauss, 1967), which is appropriate because people who are d/Deaf or hard of hearing will likely have varying needs, experiences, and frustrations and web accessibility is not one-size-fits-all.

The constant comparative method involves four stages: "(1) comparing incidents applicable to each category, (2) integrating categories and their properties, (3) delimiting the theory, and (4) writing the theory" (Glaser & Strauss, 1967, p. 105). The process begins with the researcher coding data into as many categories of analysis as he or she can. To categorize incidents, the researcher compares them to previous incidents to group them with other similar incidents. Throughout this process, the researcher records "memos" to encourage logical thinking. The researcher starts to compare and combine categories, and the theory and categories become much more established, or delimited. At this point, clear themes will have emerged from the coded data and memos, and the researcher will be able to fully establish a theory (Glaser & Strauss, 1967). For this study, once recordings were

transcribed, emerging themes were collected in a document as they were identified in transcripts during the first read-through. Transcripts were re-read, and interactions or quotes that related to those themes were pasted into the document under that theme's heading. This process was repeated until all significant notes, interactions or quotes were categorized. Finally, information listed under each theme was organized and analyzed.

Validity and Reliability

To ensure internal validity and reliability, rich, thick description was used, with detail about the setting and participants, striving to create a shared experience (Creswell, 2014); particular attention was paid to defining potential biases, including that the researcher does not identify as part of the d/Deaf community; transcripts were checked against video or audio recordings to eliminate any mistakes in transcripts; and each step was carefully documented to make the work repeatable.

This is an exploratory study and should not be treated as a complete guide to barriers in news websites for people with auditory disabilities. However, the information gathered from participants about their own experiences will act as a starting point to establish important themes and allow the news industry think more critically about how to accommodate people with varying abilities, including people who are d/Deaf or hard of hearing, on the web.

Chapter 4: Findings

During this study, participants encountered and discussed barriers that ranged from mild frustrations to catalysts for leaving websites altogether. Common barriers identified related to the existence and quality of text alternatives (such as captions or transcripts), issues with the audio itself (such as inconsistent volume or background noise), and issues with finding and using accessibility accommodations on news websites. Participants talked about how barriers affected them and why they were obstructive to news gathering. Most participants said they considered themselves informed despite the existence of these barriers, but they did say that encountering barriers can influence the sites and the content they choose to engage with and could cause them to leave a website. This would result in participants either searching for the same information elsewhere or giving up if they weren't motivated to spend time seeking out the information. The discrepancy between what participants said and how they behaved suggests that, even if they don't realize it, barriers could affect the ability for d/Dhh users to be informed by making news gathering difficult, time-consuming or frustrating.

Participants' experiences with hearing loss varied widely, and this seemed to influence the types of barriers that affected respondents as well as the degree to which barriers affected respondents. Some of the participants had hearing loss due to aging. Others were born with hearing loss or began experiencing hearing loss when they were very young. A few participants have hearing loss as a result of medical conditions. They described their hearing loss in different percentages ("I have 80 to 90 percent reception on my right maybe 30 percent on my left.") in terms of sounds they could or couldn't hear ("I

can't hear alarms and things like that.”) and in adjustments they make to hear better (“If I'm walking with someone, they're always on my left-hand side because that's the one that hears speech better.”). It became clear that people who are d/Deaf or hard of hearing are not a homogeneous group of users, and what is a barrier for one person with hearing loss might not affect someone else with hearing loss in the same way.

The first research question in this study sought to identify the barriers people who are d/Deaf or hard of hearing encounter on news websites. Barriers identified included: lack of text alternatives; insufficient captions; users not knowing how to access and use captions online; news content with video not labeled; video or audio content that plays automatically; background noise in the video; and issues with volume, such as inconsistent volume between ads and video content. A list of the identified barriers and the number of participants who encountered those barriers can be found in Table 2. However, while not the most frequently encountered barrier a lack of captions seemed to be the most frustrating barrier encountered in the study, as three participants said they would not stay on a website if it didn't have captions.

Lack of text alternatives.

Seven out of nine participants either tried to look for or use captions while on news websites, or they mentioned that they use captions. The lack of text options was a source of frustration for most respondents – both in general and when they encountered this barrier during observations. Only one website used for this study – ABCnews.com – appeared to have caption text available consistently for videos (although, as discussed later, the quality of the captions comes into question). Two other websites –

CBSnews.com and NBCnews.com – included the option to turn captions on in their video players, but videos did not always have captions.

For three participants, a lack of alternative text such as captions was a factor in determining whether to stay on a site. One participant reported feeling annoyed when videos don't have closed captions. Another, while trying to watch a video on NBCNews.com, said, "There's no captioning on this site. So am I done with it? I wouldn't stay on it." Next, the participant went to ESPN.com, tried to turn captions on for a video, found there weren't any captions and, as a result, left that website, too. Participant 9 talked about her friend, who is deaf, who will sometimes try to contact news organizations and ask them to caption videos without them. "It's not like they refuse, but sometimes it can be ignored," she said.

When considering text alternatives on websites most respondents focused on the availability of captions, but one mentioned a lack of transcripts for video content. The participant said video content was harder to consume without a transcript available because transcripts help him understand the content better, especially for interviews when the respondent wants to focus on the facial expressions and body language of the interview subject. After watching a video interview with politician Marco Rubio, he discussed the difficulty of reading captions and, at the same time, watching what's happening on screen. "I want to see Rubio's eyes," he said. "I want to see his lips. I want to see what his eyebrows do when he's asked a question and when he responds. I want to see the body language too. I can't do body language analysis and reading at the same time."

No video ads encountered by participants during this study had captions available, and although some participants noted that they felt video advertisements were an

annoyance, others felt they were missing out on content they wanted. Participant 5 said, “Mostly I don’t want to wait 15 seconds to find out if the video is going to be captioned.” Participant 9 expressed frustration that ads are seldom captioned because she sometimes wants to watch an ad, especially popular ads. “Like the Super Bowl, everyone watches the commercials,” she said. “And it’s like, everyone’s laughing at the joke, well I don’t get the joke because I didn’t understand it.”

Respondents cited a wide range of reasons for wanting text alternatives, and although some were shared by all participants – such as a preference for text – other reasons were based on the specific situation and hearing loss of the individual – such as difficulty hearing certain sounds or tones. Exploring the specific reasons participants wish for text alternatives helps provide more context and meaning around why this barrier can be so frustrating to users who are d/Deaf or hard of hearing.

Difficulty hearing certain sounds or tones. Most participants described the different tones or sounds they couldn’t hear. Some had trouble with deeper men’s voices or bass sounds, while others had trouble hearing higher-pitched sounds. This underscores the idea that people who are d/Deaf or hard of hearing are not a homogeneous group of users, and that a deep understanding of the different ways people with hearing loss experience news websites is required.

Participant 4 watched a video of a press conference about Hurricane Matthew on NBC.com and noted that “the lead-in was kind of lower, especially the first one because I think it’s ... it was that male voice, the bass.” The video was particularly interesting because a sign-language interpreter was present at the press conference and translating next

to the speaker on stage. However, Participant 4 doesn't know sign language, so he couldn't use that particular accommodation to better understand what was being said.

Preference for text. When asked how they preferred to consume news, all nine participants expressed a preference for reading text online rather than watching video or consuming multimedia, and they indicated that if text was available, either in the form of an article or text alternatives such as captions and transcripts, that would be their priority. Some participants said they skip video entirely, preferring to read news online rather than watch it. Other respondents said they depend on articles to help add context or allow them to understand a video, especially if there are no captions. Participant 9, said they like to read an article first before watching an accompanying video. "I read that first and then I see the video happening," Participant 9 said. "Because I still want to watch the video. But I want to get the background first so I can understand it completely." Another participant said she feels more confident when she reads because she's "just better at reading than I am at hearing."

Not knowing how captions work.

Participants expressed a clear desire for captions, but knowing how to turn on captions became a barrier for some. Two participants indicated that they weren't aware of how to use captions for online videos or were unfamiliar with how captions are created or where to look to know whether captions are available, which could act as a barrier to consuming news.

Participant 7 said:

I'm obviously very ignorant about if there are captions available, whether you would even start with your Internet provider or is it site by site, that kind of thing.

I don't even know where I would start that. For television, it's an option in the menu for everything, and if they have them they're gonna show up, but online I don't know if I'm supposed to ask [my Internet provider] or if I should look for it site by site. I mean just awareness of where it's ever gonna be that I should look for it.

Some participants tried right away to see if captions were available when they encountered a video. Others completely ignored the caption option, and it was unclear whether they were familiar with how to use them or just didn't feel the need to use them. During interviews with participants, some wished their videos had been captioned, but when they were watching the videos, they didn't try to turn captions on. This could be an indication that some of the participants were unfamiliar with how to turn captions on.

Insufficient captions.

Another barrier participants noted or experienced was insufficient captions. These were situations where captions are available, but they were formatted or presented in a way that create barriers to consuming the content, such as not being synchronized with audio, text not matching the audio, and text being hard to read. As Participant 5 explained, "All captions are not created equal. There are some that just make it even more confusing because they're so bad."

Text not synchronized with audio. Delayed captions or captions that are too fast-paced can make consuming content more difficult. When caption text wasn't synchronized with the timing of the audio, one participant noted that "you're going to lose a lot of what you're trying to hear." When participants encountered this barrier, they had to spend time adjusting the video player to try and get captions to synch up with the audio. When on HuffingtonPost.com, Participant 9 encountered delayed captions and tried to pause the

video to see if it fixed the delay. That reminded her of the work she has to do when trying to watch sports and keep up with the fast pace of the announcers:

The captions are super-fast. I mean they're talking fast, which I understand, but then it'll be super-fast, and then it'll pause because it's trying to catch up, and then it'll go and be super-fast and it'll pause, and then you're waiting. That kind of thing. And then it'll be. like, way too fast, so you can never read it, and then it's gone.

Incorrect text. Another barrier identified is incorrect caption text. Whether or not they are synchronized with the video, when caption text misspells words or the text doesn't relate to the topic of the story, it creates a barrier for the user. Participant 6 gets "annoyed whenever the words are wrong...like if I see a word like 'pickle' and they're [not talking about pickles] I'm gonna be like 'no,'" she said. The problem is magnified when users with hearing loss are with a group of other people, such as a classroom setting, watching a video that has captions. The group's reaction to the incorrect captions creates additional distraction for people who rely on the captions to understand what's going on in the video. One participant identified the classroom as a particularly challenging location for others reacting to incorrect captions:

Ah on YouTube. Oh my gosh. Especially like showing it in class, like it's a huge pet peeve because everybody is laughing at it. My interpreter, if it's like really bad, they'll have to interpret it for me instead. And then I will pay attention more to the interpreter than to the video. And then I'll hear people laughing, and they're laughing at the captioning, and so it's annoying. I mean it is funny, how could they get this word from that.

Hard-to-read text. Hard-to-read caption text can create another barrier for users with hearing loss. When text isn't formatted correctly or is too small, participants have to make extra adjustments, like watching the video in full-screen mode or watching a video several times. If text is especially hard to read, a user with hearing loss might not be able to consume the content at all. Participant 2 did not attempt to turn on captions while watching the videos, but upon checking the videos Participant 2 watched to see if they were captioned, barriers were apparent. One video he watched on ABCNews.com had captions in small type with a yellow drop-shadow effect, which could make the text difficult to read (Figure 1). A second video Participant 2 watched on STLtoday.com also had captions (although, again, he did not attempt to turn them on while watching the video), but the caption text ran off the screen, so half the caption text was cut off and unreadable (Figure 2). Although users didn't experience these issues during observation, they are important to note as potential barriers.

News content with video not labeled.

The tasks participants were asked to complete involved finding news content online that specifically had a video or multimedia component, but identifying that content was something most participants commented about, with many participants asking variations of, "How do I know if an article has video?" Although it was an instruction as part of the study to find content with video, if a user who is d/Deaf or hard of hearing wanted to, for example, avoid video content in favor of text articles, which is a possibility because of the participants' preference to read, that would be more difficult on news websites that didn't indicate which articles had video or were video-only. One website that did note when news

content had video was CNN.com, which uses a play button icon next to headlines to indicate that a story includes a video.

Video or audio content that plays automatically.

During observation, most participants encountered video content that played automatically, which created unprompted background noise that disrupted users, causing them to have to search for the source of the auto-playing audio to turn it off. This automatically playing content came in two forms: video that played automatically when participants navigated to a web page on a news site, or more commonly, video that played automatically immediately following a video the participant had chosen to watch and finished watching. Most often the content that played automatically was an advertisement.

In one instance, Participant 8 had finished watching a video and opened another browser window to visit a different site. After he had started looking for content on the new site, a video started auto-playing in the previous browser window he'd been using. He had to stop what he was doing on the new site to determine where the other sounds were coming from and close the browser window. Several other participants encountered the same issue, having to pause content they were watching when new content started to autoplay in a separate browser window they had left open.

Participant 9, who encountered auto-playing ads, had trouble locating where the video was coming from to turn it off because the ad had popped up in the bottom right corner of the screen. She said sometimes when she has a video playing, "there's another sound overlapping, so I can't hear it what it is with that video." She noted that having a cochlear implant means she hears sounds differently than others, and audio sounds more computerized, so overlapping audio makes distinguishing sounds difficult.

Background noise.

Participants mentioned loud or distracting background noise within a video or audio clip as another potential barrier to getting news content. Background noise such as music that is too loud can make it harder for people with hearing loss to distinguish the main audio. “It’s usually the dum-diddy-dum-dum-dum stuff and then they’re talking over that,” one participant said. “I know you can separate tracks. They need to scale that track way back and maybe pull the volume on the other one.” Three other participants noted that during a video interview when the camera was not focused on the speaker or b-roll footage was being shown while someone was talking, it was harder to make out what someone was saying when there was too much background noise and they weren’t able to read lips or watch body language for context clues.

Volume.

Volume was a major theme, but it’s unclear how much of a barrier it can be and in what ways. Most of the time, it seemed that volume was more of a slight inconvenience rather than a barrier for participants, many of whom said they were used to fiddling with volume to be able to hear. After the observation portion, Participant 6 noted, “you saw my volume is literally all the way up.” The same participant also described adjusting the volume as if it were one more step in between her and getting news: “By the time I load and I watch an ad and I figure out the volume, and then I’m like ‘Oh great, this person has an accent and I can’t even understand them.’” Perhaps having to adjust the volume is a minor nuisance, but her comment suggests that it can seem like another item on the list of potential barriers users who are d/Deaf or hard of hearing have to worry about or adjust to be able to adequately hear or consume a video. There was one instance of a participant

having to turn down the volume in between an advertisement and a video news story, which indicates that inconsistency in volume between ads and content could be a barrier people who are d/Deaf or hard of hearing, requiring them to adjust volume frequently or have to re-watch portions of video content they miss due to low volume.

Overall, barriers encountered or discussed in this study fell into three main categories: 1) issues with text alternatives 2) issues with the content's audio and 3) awareness of the most accessible way to consume content. Issues with text alternatives included lack of text alternatives, which seemed to be the most common barrier encountered during the study as well as the most obstructive barrier for people with more severe hearing loss. Another barrier in this category, insufficient captions, seemed to be just as obstructive as lack of captions in some cases, because if caption text is incorrect or unreadable, it can render the captions useless.

Issues with audio seemed to be more obstructive for people with more severe hearing loss. These barriers included auto-playing audio and video content, which was encountered by almost every participant in this study. Background noise, another audio issue participants encountered, seemed to be exacerbated by a lack of alternative text or insufficient alternative text. Issues with volume required participants to spend extra time and effort making adjustments to be able to consume content with audio. Finally, a lack of knowledge about how captions work coupled with poorly labeled news content left some participants unsure of how to find the content they needed in the way they could most easily consume it.

The second research question asked to what degree people with auditory disabilities believe accessibility barriers on news sites affect their ability to be informed citizens. This

is a more difficult question to answer based on the data collected. When talking about accessing news, most participants said they felt informed. None of the participants said they felt uninformed about local or national news as a result of their hearing loss or the barriers they encountered. In fact, many of the participants expressed that they don't have issues accessing news, possibly because participants interpreted the word "access" to mean knowing how to locate and where to get information they want. Participants who said they didn't feel informed didn't attribute that feeling to their hearing loss. They instead cited laziness or intentionally avoiding news because it made them anxious or sad. This study occurred during a presidential election cycle, so many participants expressed that they felt overwhelmed or exhausted by political news. "Yeah, I didn't watch the vice-presidential debate, thank you so much," Participant 1 said. "I watched a Canadian real estate show instead."

During the interviews, questions of access would often lead to discussions of how people get their news on a daily basis, and many participants mentioned social media, email news subscriptions and using search engines to find specific news they wanted. As an example, Participant 6 described herself as a Millennial who relies on her smartphone and social media apps Facebook and Snapchat for all of her news. "You can get news so much more easily than you used to be able to," she said. "I'm so lazy when it's easier to me. I don't ever, like, type in Huffington Post on my desktop. It's always on my phone."

Although none of the participants directly stated that they felt inaccessible news websites contributed to any feelings of being uninformed, they indicated that it might influence the sites and the content they choose to engage with. Participant 7 said she would make decisions about which sites to go to based on whether their videos were captioned:

“Yeah, I mean as captions become more of an option if they are ever going to be online, I would more than avoid [websites] without it, I would seek out ones that did have them,” she said. She followed up via email after her interview saying that perhaps her hearing loss might subconsciously affect how she consumes news and what type of content she chooses to watch or read. “It just struck me that maybe the reason the videos I chose of the explosion and the plane crash are because it is easier to gather what happened in the visual format than having to listen to only an announcer,” she wrote. “By kind of the same token, I wouldn't usually choose a video of a debate but the title read ‘highlights of the final debate,’ as in listening less and possibly still being able to grasp the main points.” Another respondent described how she would leave one site without captions and try to find the same piece of news on a different site that had captions: “If I really want to see it, I will actually try to look it up online if it’s from another news source or website,” she said.

Despite the fact that participants didn’t directly state that they feel marginalized or treated unfairly, watching them use news websites and hearing them describe their use of news indicated that barriers can lead to feelings of frustration or an awareness that they have to make certain adjustments that people who are not d/Deaf or hard of hearing do not have to make to be able to consume news. In some cases, the barriers participants encountered completely prevented them from consuming news they had chosen to engage with, forcing them to seek the information elsewhere or do without the content they wanted. Respondents also commonly described situations where experiences were unequal, whether it was not being able understand the jokes in Super Bowl commercials that had their friends laughing, having to contact organizations to ask that they caption a video or

having trouble understanding a video being shown in a classroom because captions were incorrect.

Chapter 5: Discussion

This study sought to explore how people with hearing loss use news websites and the potential problems that limit their ability to be informed citizens. Media has a social responsibility to inform, and barriers to access on news websites can hinder the process or prevent consumption entirely. The findings suggest that d/Dhh individuals do encounter barriers when consuming news online, and those barriers can affect the way they gather news and, potentially, their ability to be informed. Although most participants in this study said they felt informed in general, there is evidence that the barriers d/Dhh individuals encounter on news websites do affect their ability to be as informed as someone who does not have hearing loss because they often have to work harder or spend more time to consume content, even if they don't realize that their experience is unequal to that of someone without hearing loss.

These findings suggest that perhaps feeling informed (or saying you feel informed) is not the same thing as being informed. Participants who said they *felt* informed also left websites because they didn't have captions or, after watching a video, remarked on what made the video difficult or frustrating to consume. Participants who said they didn't feel informed cited laziness or feeling overwhelmed, which suggests that they sometimes avoid news altogether, in which case they wouldn't encounter barriers as often as people who were motivated to regularly consume news online.

Participants might have felt pressure, especially during a heated election cycle, to appear informed. They could have wanted to downplay the effects that their hearing loss has on their daily lives. Or, as Participant 7 pointed out, they might not be totally aware of exactly when and how being d/Deaf or hard of hearing is affecting their ability to consume

news. This area would benefit from further study, specifically around whether d/Dhh users who get news online *are* less informed rather than focusing on whether d/Dhh users say they feel informed.

It's very likely that none of the barriers encountered during this study would be surprising to the web accessibility community. Perhaps one of the most affirming aspects of these findings is how closely many of these barriers correspond to barriers outlined in the Web Content Accessibility Guidelines 2.0. This suggests that not only are these barriers common on the web, they're also addressable and avoidable, as WCAG 2.0 also provides success criteria for how web developers can remove or mitigate these barriers online to make sites more accessible. Web developers and news organizations can arrange for videos to have captions by tasking content creators with adding captions or by paying third-party services to caption videos. They can check to make sure captions are correct and synchronized with audio. They can turn captions on by default. They can label content clearly so users with hearing loss know when an article or piece of content includes audio or video. They can minimize background noise in videos and use sound effects or background music more strategically. They can design their websites and video players so users know that captions are available and are clear on how to turn them on.

It's clear from these findings that accessibility accommodations on news websites can benefit users who are d/Deaf or hard of hearing, but it's also important to discuss how accessibility accommodations can benefit news organizations. Henquinet (2014) noted three major reasons news organizations should pay attention to accessibility: readership, equal access and the idea that accessibility and usability help everyone. Although Henquinet's study focused on people who are blind, many of the points of discussion for

the ideas apply to people who are d/Deaf or hard of hearing and to web accessibility in general.

Readership.

News organizations with websites that are accessible to people who are d/Deaf or hard of hearing could have a better chance of attracting d/Dhh readers and keeping them engaged. There were several examples of participants either navigating away from sites when they encountered barriers or expressing that they would seek out sites with fewer barrier related to hearing. As Participant 1 said, “You only get one chance with me,” referring to news websites in general. In an environment where news organizations pay such close attention to ratings, numbers and web traffic, any potential chance to attract and retain more regular readers could be seen as an attractive business opportunity.

The potential impact on readership could be vast, as nearly one in five people 12 years or older in the United States having some type of hearing loss (Lin, Niparko & Ferrucci, 2011) and the World Health Organization estimates that five percent of the world’s population has “disabling hearing loss,” a categorization based on decibels (“Deafness and hearing loss,” 2017). That’s a substantial amount of potential readers or viewers to affect, and it creates a potentially strong business case for accessibility of news websites. Inaccessible websites or websites that include major barriers for people who are d/Deaf or hard of hearing have the potential to alienate readers and send them to a competitor’s site. The Worldwide Web Consortium (W3C) states that organizations have the potential to see a large return on investment that offset the costs of implementing Web accessibility, such as hiring more web developers or paying outside vendors to caption videos. There is also evidence that people without hearing loss are motivated to use

captions. A 2006 study by Ofcom, the communications regulator in the U.K., found that 80% of people who used closed captions had no hearing loss at all (Ofcom, 2006, p. 11). They cited the main reasons for using captions as not wanting to have the TV too loud or being in a noisy room.

W3C cites financial gains and social responsibility as two factors that can contribute to a business case, and both would be directly relevant to news organizations. Financial gains can come from “increased audience (more users) and increased effectiveness (more use)” that organizations often see when their website is more accessible because it becomes easier for people – including people without disabilities – to find the website, access it, and successfully use it (Arch & Henry, “Financial factors,” 2012). From a social standpoint, accessible websites can expand “opportunities for communication, social interaction, and community participation” (Arch & Henry, “Social factors,” 2012), helping make the case for news organizations that want to act socially responsibly, contributing to a democratic society by making information more accessible to the public.

Equal experiences.

When news organizations address or remove accessibility barriers on their websites, they create more equal experiences so that readers, regardless of whether they have a disability, can come away from a piece of content with the information it intended to convey. Participants in this study demonstrated and talked about the types of information they seek out: weather, sports, election coverage, celebrity news, and more. Regardless of whether someone is d/Deaf or hard of hearing, they want to know about what’s happening in their community and in the world. There is nothing about being d/Deaf or hard of hearing

or having a disability that makes someone less deserving of information. However, because, as this study shows, barriers do exist on news websites, d/Dhh individuals can either consciously or subconsciously avoid certain types of news content that are harder to consume or require more effort to consume and the websites that produce that content.

Improved usability for everyone.

The W3C notes that accommodations for accessibility often improve usability for all users. People on mobile devices, older people, people with lower literacy, children learning to read and people with temporary disabilities are all examples of groups that can benefit from accessibility accommodations such as alternative text, for example (“Developing a web accessibility business case,” 2012). Participants in this study mentioned several situations where captions were helpful, such as learning a language, being in noisy environments, or forgetting their headphones. Many people — not just d/Dhh individuals — experience these types of situations. If news organizations improve accessibility for people who are d/Deaf or hard of hearing, they could also benefit the new parent who doesn’t want to wake his sleeping baby while looking at the news online, the college student who is catching up on news before class but doesn’t want to wake her roommate or the international traveler who is watching the news on the airport TV at the gate. These possibilities only bolster the business case for accessibility because it widens the potential impact of accommodations.

In the current media environment where the Internet has become a primary place to consume news – especially news content in the form of video – organizations could think more carefully about how to provide the same level of access and usability to people with hearing loss as people without hearing loss. The results of this study create an argument

for news organizations to seek out information on how d/Dhh individuals currently use their websites and use that information to reduce barriers to access for d/Dhh individuals. This is in line with critical disability theory, which insists on consulting a group of people about their own experiences to address the oppression of that group. Especially because the effects of barriers can vary depending on the type and severity of hearing loss, it's important for news organizations to understand the specific needs of this audience to be able to serve them on the web. Related to this, it's important to keep in mind the finding that users with hearing loss are not a homogenous group of users who experience the same barriers in the same ways. This underscores the importance of critical disability theory and the expectations we have for what it means to be d/Deaf or hard of hearing. If news organizations think about d/Dhh individuals as one homogeneous group, they risk developing "one-size-fits-all" accessibility accommodations that benefit a select group of users."

By addressing accessibility barriers for people who are d/Deaf or hard of hearing, news organizations can act more socially responsibly and contribute to a society where all citizens have equal access to news and information that can affect them. Improving accessibility for d/Dhh individuals means news organizations also provide benefits for other audiences such as older adults, non-native speakers, and users in low-bandwidth situations. Looking to users with auditory disabilities for guidance will help researchers identify some of the barriers that exist and make recommendations for how news organizations can address them.

Limitations and Areas for Further Study

This study only focused on the barriers found on news websites, which is only one way people today get news. Many of the participants in this study mentioned other news sources that would make good areas for research, such as television, social media and radio. It would be valuable to explore the barriers people who are d/Deaf or hard of hearing encounter while using these other media and how they react to or mitigate those barriers to consume news. This study also focused on national news websites, although many participants mentioned local news websites during interviews. Research on the accessibility of local news websites would be valuable because often local news sites are where people turn to for information that affects their daily lives, such as community events, local elections and weather. Analysis of the user experience for people who are d/Deaf or hard of hearing could be another potential area for research. The use of eye-tracking technology or analysis of how users move through a site could provide more information for how d/Dhh individuals might make decisions differently on news websites. The process of developing that user experience could also be a focus of future research. How do organizations create policy or structure to build and test accessible websites? What organizations successfully design accessible websites, and what factors allow them to do so?

Additionally, this study purposefully sought out people who seek out and consume news online, but other studies could explore the possibility that some people who are d/Deaf or hard of hearing might avoid online news *because* of the barriers that exist and instead choose to get news another way. Future research could explore preferences for consuming news among people who are d/Deaf or hard of hearing and whether the prevalence of accessibility barriers is a contributing factor.

Another limitation of this study is the lack of diversity among participants. All of the participants were white, most participants were older adults, most were college-educated or in college, and most had mild to moderate hearing loss. The most successful recruitment tactic used during this study was an ad in a weekly university email newsletter, so many of the participants were associated with the university in some way, either as students, staff or faculty. It's possible that participants who are college educated might have an easier time avoiding or maneuvering around barriers because of higher literacy levels. For example, someone who is college-educated might not be able to consume a video but could very easily read and understand an accompanying article. Further research could seek to diversify participants or study different groups, focusing more on d/Dhh individuals with lower literacy levels or less education. Future research could also focus specifically on people who are profoundly d/Deaf, people with cochlear implants, or teenagers or young adults with hearing loss.

Figures

Figure 1

Figure 2

Table 1
Description of Participants

Participant #	Description
1	Participant 1 is a woman in her mid-60s with moderate hearing loss.
2	Participant 2 is a male in his late 40s who lost some of his hearing in his 30s and has had surgeries in both ears. He has 80 to 90 percent hearing in his right ear and maybe 30% hearing in his left ear.
3	Participant 3 is a women in her early 60s who describes her hearing loss as “moderately severe” and uses hearing aids
4	Participant 4 is a male who has hearing loss in both ears who has lost his hearing in the past 10 or 15 years and has a middle ear implant.
5	Participant 5 is a 55-year-old woman who has had hearing loss since birth.
6	Participant 6 is a woman in hear early 20s who describes herself as being partially deaf, with 40-45% of her hearing in her right ear.
7	Participant 7 is a woman in her 50s who says she has 30% hearing in her right ear.
8	Participant 8 is a man in his late 50s who is deaf in one ear due to surgery to remove a brain tumor where the auditory nerve was cut.
9	Participant 9 is a woman in her early 20s who is deaf and has a cochlear implant.

Table 2
Frequency of Barrier Occurances

# of Participants Who Encountered the Barrier	Barrier Type
8	Video or audio that plays automatically
7	Lack of text alternatives
7	News content with video not labeled
6	Volume
5	Insufficient captions
4	Background noise
2	Not knowing how captions work

References

- Adam, A., & Kreps, D. (2006). Enabling or disabling technologies? A critical approach to web accessibility. *Information Technology & People*, 19(3), 203-218.
- Aizpurua, A., Arrue, M., & Vigo, M. (2015). Prejudices, memories, expectations and confidence influence experienced accessibility on the web. *Computers in Human Behavior*, 51, 152-160. doi:10.1016/j.chb.2015.04.035
- American Press Institute. (2014). The personal news cycle: How Americans choose to get their news. Retrieved June 14, 2016 from <https://www.americanpressinstitute.org/publications/reports/survey-research/personal-news-cycle/single-page/>
- Arch, A. and Henry, S. L. (Eds.). (2012, September 2). *Developing a web accessibility business case for your organization: overview*. Retrieved from <https://www.w3.org/WAI/bcase/>
- Arch, A. and Henry, S. L. (Eds.). (2012, September 2). *Financial factors in developing a web accessibility business case for your organization*. Retrieved from <https://www.w3.org/WAI/bcase/fin>
- Arch, A. and Henry, S. L. (Eds.). (2012, September 2). *Social factors in developing a web accessibility business case for your organization*. Retrieved from <https://www.w3.org/WAI/bcase/soc>.
- Asch, A. (2001). Critical race theory, feminism, and disability: Reflections on social justice and personal identity. *Ohio State Law Journal*, 62(1), 391.
- Audio Control: Understanding SC 1.4.2. (2017, January 2). Retrieved from <https://www.w3.org/TR/UNDERSTANDING-WCAG20/visual-audio-contrast-dis-audio.html#visual-audio-contrast-dis-audio-techniques-head>
- Brennan, Bonnie S. (2013). *Qualitative research methods for media studies*. New York: Routledge.
- Captions (Prerecorded): Understanding SC 1.2.2. (2017, January 3). Retrieved from <https://www.w3.org/TR/UNDERSTANDING-WCAG20/media-equiv-captions.html>
- Christians, C. G. (2009). Normative theories of the media [electronic resource]: Journalism in democratic societies. Urbana: University of Illinois Press. doi:10.5406/j.ctt1xcjws
- Clare, E. (2001). Stolen bodies, reclaimed bodies: Disability and queerness. *Public Culture*, 13(3), 359-365. doi:10.1215/08992363-13-3-359

- Comeaux, D., & Schmetzke, A. (2013). Accessibility of academic library web sites in North America. *Library Hi Tech*, 31(1), 8-33. doi:10.1108/07378831311303903
- Commission on the Freedom of the Press. (1947). *A Free and Responsible Press*. Chicago: University of Chicago Press.
- Crespo, R. G., Espada, J. P., & Burgos, D. (2016). *Social4all: Definition of specific adaptations in web applications to improve accessibility*. *Computer Standards & Interfaces*, 48(1), 1-9. doi:10.1016/j.csi.2016.04.001
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). Los Angeles: SAGE Publications.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks: SAGE Publications.
- Davis, J. J. (2003). Accessibility divide: The visually-impaired and access to online news, 10 *The J. Broad. & Elec. Media*, 47, 474. doi:10.1207/s15506878jobem4703_9
- Deafness and hearing loss. (2017, January 31). Retrieved from <http://www.who.int/mediacentre/factsheets/fs300/en/>
- Devlin, R. F., & Pothier, D. (2006). *Critical disability theory: Essays in philosophy, politics, policy, and law*. Vancouver: UBC Press.
- Elcessor, E. (2012). Captions on, off, on TV, online: Accessibility and search engine optimization in online closed captioning. *Television & New Media*, 13(4), 329-352. doi:10.1177/1527476411425251
- Facebook. (2013, December 17). *Testing a new way for marketers to tell stories in news feed*. Retrieved June 25, 2016, from <https://www.facebook.com/business/news/Testing-a-New-Way-for-Marketers-to-Tell-Stories-in-News-Feed>
- García, M., & Diaz, A. (2010). Usable and Accessible Websites in SMEs. Challenges for the Future. *Revista Latina De Comunicación Social*, 13(65), 1-16.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine Pub. Co.
- Gonçalves, R., Martins, J., Pereira, J., Oliveira, M. A., & Ferreira, J. J. P. (2013). Enterprise web accessibility levels amongst the forbes 250: Where art thou O virtuous leader? *Journal of Business Ethics*, 113(2), 363-375. doi:10.1007/s10551-012-1309-3
- Hackett, S., & Parmanto, B. (2005). A longitudinal evaluation of accessibility: Higher education web sites. *Internet Research*, 15(3), 281-294. doi:10.1108/10662240510602690
- Harrell, M. C., Bradley, M., Rand Corporation, & National Defense Research Institute (U.S.). (2009). *Data collection methods [electronic resource]: Semi-structured interviews and focus groups*. Santa Monica, CA: RAND.

- Henderson, V., Grinter, R., & Starner, T. (2005). *Electronic Communication by Deaf Teenagers*. Technical Report GIT-GVU-05-34, Georgia Institute of Technology, GVU Center, College of Computing. Retrieved from <https://smartech.gatech.edu/bitstream/handle/1853/8451/05-34.pdf>
- Henquinet, M. M. (2014). *Increasing accessibility: How news websites can better serve people with visual disabilities* (Master's thesis). Retrieved from MOspace <https://hdl.handle.net/10355/45723>.
- Hosking, D. (2008, September 2-4). *Critical disability theory*. Paper presented at the 4th Biennial Disability Studies Conference, Lancaster University.
- Kovach, B., & Rosenstiel, T. (2014). *The elements of journalism: What newspeople should know and the public should expect* (3rd ed.). New York: Three Rivers Press.
- Ladd, P. (2003). *Understanding deaf culture [electronic resource]: In search of deafhood*. Clevedon, England;Buffalo,: Multilingual Matters.
- Leitner, M., Strauss, C., & Stummer, C. (2016). Web accessibility implementation in private sector organizations: Motivations and business impact. *Universal Access in the Information Society*, 15(2), 249-260. doi:10.1007/s10209-014-0380-1
- Lewthwaite, S. (2014). Web accessibility standards and disability: Developing critical perspectives on accessibility. *Disability & Rehabilitation*, 36(16), 1375-1383. doi:10.3109/09638288.2014.938178
- Lin, F. R., Niparko, J. K., & Ferrucci, L. (2011). Hearing loss prevalence in the United States. *Archives of Internal Medicine*, 171(20), 1851-1853. doi:10.1001/archinternmed.2011.506
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, Calif: Sage Publications.
- Louise Roberts, V., & Fels, D. I. (2006). Methods for inclusion: Employing think aloud protocols in software usability studies with individuals who are deaf. *International Journal of Human - Computer Studies*, 64(6), 489-501. doi:10.1016/j.ijhcs.2005.11.001
- Low or No Background Audio: Understanding SC 1.4.7. (2017, January 2). Retrieved from <https://www.w3.org/TR/2016/NOTE-UNDERSTANDING-WCAG20-20161007/visual-audio-contrast-noaudio.html>
- Maatta Smith, S. L. (2014). Web accessibility assessment of urban public library websites. *Public Library Quarterly*, 33(3), 187-204. doi:10.1080/01616846.2014.937207
- Maiorana-Basas, M., & Pagliaro, C. (2014). Technology use among adults who are deaf and hard of hearing: A national survey. *Journal of Deaf Studies and Deaf Education*, 19(3), 400-410. doi:10.1093/deafed/enu005

- Mckee, M., Schlehofer, D., & Thew, D. (2013). Ethical issues in conducting research with deaf populations. *American Journal of Public Health*, 103(12), 2174-2178. doi:10.2105/AJPH.2013.301343
- Meekosha, H. & Shuttleworth, R. (2009). What's so 'critical' about critical disability studies?. *Australian Journal of Human Rights*, 15(1), 47-76.
- Merriam, S. B. (1988). *Case study research in education: A qualitative approach* (1st ed.). San Francisco: Jossey-Bass.
- Möbus, L. (2010). Making web content accessible for the deaf via sign language. *Library Hi Tech*, 28(4), 569-576. doi:10.1108/07378831011096231
- National Institute on Deafness and Other Communication Disorders. (2017, March 6). *Cochlear Implants*. Retrieved from <https://www.nidcd.nih.gov/health/cochlear-implants>
- Nerone, J. C. (1995). *Last rights: Revisiting four theories of the press*. Urbana: University of Illinois Press.
- Ofcom. (2006). *Provision of access services – research study conducted for Ofcom*. Retrieved from https://www.ofcom.org.uk/__data/assets/pdf_file/0019/45343/provision.pdf
- Olalere, A., & Lazar, J. (2011). Accessibility of U.S. federal government home pages: Section 508 compliance and site accessibility statements. *Government Information Quarterly*, 28(3), 303-309. doi:10.1016/j.giq.2011.02.002
- Padden, C., & Humphries, T. (1988). *Deaf in America: Voices from a culture*. Cambridge, Mass: Harvard University Press.
- Pascual, A., Ribera, M., & Granollers, T. (2015). Impact of web accessibility barriers on users with a hearing impairment. *Dyna*, 82(193), 233.
- Patel, S. (2016, May 17). *85 percent of Facebook video is watched without sound*. Retrieved June 25, 2016 from <http://digiday.com/platforms/silent-world-facebook-video/>
- Paul, P. (2015). d/Deaf and hard of hearing with a disability or an additional disability: The need for theory, research, and practice. *American Annals of the Deaf*, 160(4), 339-343. doi:10.1353/aad.2015.0029
- Peters, C., & Bradbard, D. A. (2010). Web accessibility: An introduction and ethical implications. *Journal of Information, Communication and Ethics in Society*, 8(2), 206-232. doi:10.1108/14779961011041757
- Peters, C., & Bradbard, D. A. (2007). Web accessibility: An introduction and implications for a corporate social responsibility marketing strategy. *Journal of Internet Commerce*, 6(4), 27-54. doi:10.1080/15332860802086185

- Providenti, M., & Zai, R. (2007). Web accessibility at academic libraries: Standards, legislation, and enforcement. *Library Hi Tech*, 25(4), 494-508. doi:10.1108/07378830710840455
- Reaume, G. (2014). Understanding critical disability studies. *Canadian Medical Association Journal*, 186(16), 1248-1249. doi:10.1503/cmaj.141236
- Rutgersson, S., & Arvola, M. (2007, September 27-28). User interfaces for persons with deafblindness. Paper presented at the 9th ERCIM Workshop: User Interfaces For All, Linköping, Sweden.
- Shields, M. (2015, June 8). *Marketers, creative ad execs adjust to video ads with no sound*. Retrieved June 26, 2016 from <http://blogs.wsj.com/cmo/2015/06/08/marketers-creative-ad-execs-adjust-to-video-ads-with-no-sound/>
- Shiver, B. N. & Wolfe, R. J. (2015, October 26-28), *Evaluating alternatives for better deaf accessibility to selected web-based multimedia*. Paper presented at The 17th International Conference on Computers and Accessibility (ASSETS 2015), Lisbon, Portugal. doi:10.1145/2700648.2809857
- Siebert, F. S., Peterson, T., & Schramm, W. (1963). *Four theories of the press: The authoritarian, libertarian, social responsibility, and soviet communist concepts of what the press should be and do*. Urbana: University of Illinois Press.
- Stewart, E. (2014). *Rethinking access to address the digital divide in news*. (Master's project). Retrieved from MOspace <https://hdl.handle.net/10355/44646>
- Temple, B., & Young, A. (2004). Qualitative research and translation dilemmas. *Qualitative Research*, 4(2), 161-178. doi:10.1177/1468794104044430
- Thatcher, J. (2006). Web Accessibility: Web Standards and Regulatory Compliance [electronic resource]. Berkeley, CA; New York; Friends of Ed.
- The Pew Research Center. (2012). *Trends in News Consumption: 1991-2012*. Retrieved from <http://www.people-press.org/2012/09/27/in-changing-news-landscape-even-television-is-vulnerable/>.
- The Pew Research Center. (2016). *The Modern News Consumer*. Retrieved from <http://www.journalism.org/2016/07/07/pathways-to-news/>
- Thompson, T., Comden, D., Ferguson, S., Burgstahler, S., & Moore, E. J. (2013). Seeking predictors of web accessibility in U.S. higher education institutions. *Information Technology and Disabilities*, 13(1)
- Time-based media: Understanding Guideline 1.2. (2017, January 3). Retrieved from <https://www.w3.org/TR/UNDERSTANDING-WCAG20/media-equiv.html>

- U.S. Census Bureau. "Nearly 1 in 5 People Have a Disability in the U.S., Census Bureau Reports." (2012, July 5). Retrieved March 20, 2016, from <https://www.census.gov/newsroom/releases/archives/miscellaneous/cb12-134.html>
- W3C. (2008). Web content accessibility guidelines 2.0. W3C working draft.
- W3C. (2016). Understanding WCAG 2.0. Retrieved June 26, 2016 from <https://www.w3.org/TR/UNDERSTANDING-WCAG20/Overview.html>
- WebAIM: Types of Auditory Disabilities. (2013). Webaim.org. Retrieved 15 June 2016 from <http://webaim.org/articles/auditory/auditorydisabilities>
- Young, A., & Hunt, R. (2011). Research with d/Deaf people (First ed.) (Methods Reviews). NIHR School for Social Care Research.
- Youngblood, N., & Lysaght, R. (2015). Accessibility and use of online video captions by local television news websites. *Electronic News*, 9(4), 242-256.
- Yu, D. X., & Parmanto, B. (2011). U.S. state government websites demonstrate better in terms of accessibility compared to federal government and commercial websites. *Government Information Quarterly*, 28(4), 484-490. doi:10.1016/j.giq.2011.04.001
- Zdenek, S. (2011). *Which sounds are significant? Towards a rhetoric of closed captioning*. *Disability Studies Quarterly*, 31(3). 1-23.