The University of Texas at Austin
Texas Education Review
College of Education

Journal Homepage: Texas Education Review
Published online: July 2019
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To cite this article: Taylor, Z.W. (2019). Web (in)accessible: Supporting access to Texas higher education for students with disabilities. *Texas Education Review*, *7*(2), 60-75.
http://dx.doi.org/10.26153/tsw/2285

Web (In)Accessible: Supporting Access to Texas Higher Education for Students with Disabilities

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With the rise of Internet technologies since the early to mid-1990s, United States (U.S.) Congress amended Section 508 of the Rehabilitation Act of 1973 in 1998 to reflect the changing landscape of digital technologies and information accessibility for individuals with disabilities (28 C.F.R. § 35, 1998). Therein, nearly all postsecondary institutions in the U.S. were required to ensure that their websites were accessible, thus providing equal access to information and communication technology for individuals with disabilities: a public entity shall take appropriate steps to ensure that communications with applicants, participants, members of the public, and companions with disabilities are as effective as communications with others (28 C.F.R. § 35, 1998).

Under both Title II and Title II of ADA, postsecondary institutions must produce communication that is effective in both physical and digital settings, ensuring that people with disabilities have the same access to that communication as non-disabled people. In the twenty years since Section 508's amendment in 1998, individuals with disabilities have opened hundreds of court cases and formal complaints against institutions of higher education, charging that a wide variety of digital communications were not accessible and this lack of accessibility negatively impacted their postsecondary education (Carlson, 2018; LaGrow, 2017).

For instance, in 2010, an Arizona State University student who is blind, sued the university over its use of Amazon's Kindle e-reader technology. The lawsuit alleged that e-book technology did not include audible menus allowing individuals who are blind access to the educational content, and thus, the student was not able to navigate their Spanish 101 e-textbook (Parry, 2010). Moreover, advocacy groups for the deaf filed federal lawsuits against the Massachusetts Institute of Technology and Harvard University, claiming both institutions violated Section 508 and the Rehabilitation Act of 1973 by failing to provide closed captioning services for those who are deaf or hard of hearing (Lewin, 2015). Most recently, Jason Camacho—a blind man from New York—sued fifty colleges and universities, alleging that their institutional websites were not navigable using a screen reader, one form of assistive technology. According to the lawsuits, Camacho attempted to access information regarding admission requirements and degree programs, yet he was unable to successfully use his screen reader technology on institutional websites. This was due to each website missing metadata (McKenzie, 2018), or information linked to a web element on a webpage to describe what a web element is (e.g., picture, video, hyperlink), and what may happen if a user interacts with an element (e.g., clicking a hyperlink and being directed to a different webpage).

In response to the many concerns surrounding web accessibility for people with disabilities, in January 2017, the U.S. Federal Government adopted Web Content Accessibility Guidelines (WCAG 2.0) Levels of A and AA standards for all websites falling under the purview of ADA, including Title IV institutions of higher education (Grzymkowski, 2017). This adoption, which officially began on January 18, 2018, required institutions of higher education to comply with WCAG 2.0 Level AA web accessibility, meaning all postsecondary institutions in the U.S. must "create and publish digital content—web pages, documents, images, videos, audio" at level AA standards (LaGrow, 2017, para. 11). To meet Level AA, WCAG 2.0 outlined four core principles of web accessibility:

> Perceivable: Information and user interface components must be presentable to users in ways they can perceive. (W3C, 2017, para, 1). Operable: User interface components and nav-

> igation must be operable (W3C, 2017, para. 28). Understandable: Information and the operation of user interface must be understandable. (W3C, 2017, para. 53). Robust: Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies. (W3C, 2017, para. 74).

For example, in terms of perceivable web content, WCAG 2.0 guidelines assert that time-based media must be captioned. Level A compliance requires time-based media, such as a video, maintain that "Captions are provided for all prerecorded audio content in synchronized media, except when the media is a media alternative for text and is clearly labeled as such" (W3C, 2017, para. 6). Institutions of higher education, however, must meet all Level A compliance standards in addition to the Level AA compliance standard requiring that "Captions are provided for all live audio content in synchronized media" (para. 8). In total, as of January 18th, 2018, institutions of higher education websites must meet over one hundred Level A and AA compliance standards to meet the compliance threshold and be deemed web accessible by the U.S. Government and the Department of Justice (LaGrow, 2017).

On top of the hundreds of court cases alleging web inaccessibility, recent higher education research has suggested that a wide variety of student-focused content is unreadable by its intended audience. For example, Taylor (2017a) found that the average readability of international graduate student admission materials on postsecondary websites were written above the 15th-grade reading level, with some materials written above the 19th-grade reading level. In another study that included a random sample of 100 articulation agreements between two- and four-year institutions in Texas, Taylor (2017b) found that 69% of all articulation agreements on postsecondary websites were written at or above the 16th-grade reading level. This unreadability also violates ADA, as WCAG 2.0 Guideline 3.1 asserts that text ought to be readable and understandable by a wide audience (W3C, 2017). According to WCAG 2.0 standards, "content should be written as clearly and simply as possible," for its readability to adhere to the "Understandable" principle (WC3, 2016b, para. 2). Content that is more advanced than lower secondary education readability level requires supplementary content to clarify and simplify the material, and content requiring an advanced education should be limited (WC3, 2016b). WCAG 2.0 defines lower secondary education level as between 7th- and 9th-grade reading comprehension levels and advanced education as the 12th-grade reading comprehension level or higher (WC3, 2016b), meaning that the majority of content in Taylor's studies (2017a, 2017b) would not have met Level AA compliance standards as required by federal law.

Moreover, Taylor (2018a) articulated that across a random sample of 335 public and non-profit private four-year institutions in the U.S. the average readability of international undergraduate admission materials on postsecondary websites was near the 14th-grade reading level, and only 1% of institutions provided content in languages other than English. WCAG 2.0 standards also include the "Language of parts," which requires that "user agents can correctly present content written in multiple languages" (WC3, 2016a, para. 2). In addition, states with large Spanish-speaking populations have passed laws to ensure that web content is translated into multiple languages as part of web accessibility (Texas Administrative Code, Chapter 206, 2012).

For instance, State of Texas Electronic and Information Resources (EIR) standards assert that all state agencies must follow ADA Section 508 guidelines when updating and changing their state-supported websites. The same standards demand that institutions of higher education "must make a reasonable effort to ensure that Spanish-speaking persons of limited English proficiency can meaningfully access state agency website information in accordance with provisions of Texas Government Code §2054.116" (Texas Administrative Code, Chapter 206, 2012, para. 1). In addition, state agencies, such as institutions of higher education, "should consider providing the content of their websites in the primary language or languages used by the people using the website" (Texas Administrative Code, Chapter 206, 2012, para. 2). Considering Taylor's (2018a) translation study,

WCAG 2.0 standards, and State of Texas laws, it is likely that many Texas postsecondary institutions in the study were in violation of both federal and state laws regarding the translation of web content for audiences of diverse language backgrounds and abilities.

Therefore, this case study serves as an early audit of postsecondary websites as of January 18, 2018, the day in which WCAG 2.0 Level AA compliance was mandated as part of Section 508 (LaGrow, 2017) to learn whether postsecondary institutions composed accessible websites for people with disabilities and people who are not fluent in English. Specifically, this study sought to answer two research questions (RQ):

> RQ1: Had Title IV institutions of higher education in Texas published web accessible websites by January 18th, 2018 as mandated by the amendment of Section 508?
>
> RQ2: If applicable, what are problematic elements of these institutional websites for people with disabilities?

By answering these two questions, both researchers and practitioners—in Texas and beyond—may better understand postsecondary websites and the hurdles they may pose to people with disabilities. As a result, these institutions may be held accountable for their digital communication with people with disabilities, possibly resulting in a more equitable digital landscape for people with disabilities attempting to access higher education in the United States.

Literature Review

As of April 2019, no extant research has specifically addressed the web accessibility of the websites of Title IV institutions of higher education in Texas. However, educational researchers in the fields of disability studies, computer science, and technology have produced several analyses which guide and provide context for this study. Outside of U.S. higher education contexts, one of the earliest web accessibility studies was Kelly's (2002) work focused on United Kingdom (U.K.) university websites (N=162). In the work, Kelly (2002) learned less than 3% of U.K. university websites were compliant with Level AA standards outlined by the 1.0 version of WCAG. Kelly (2002) utilized the Bobby™ web accessibility tool and discovered that the majority of web accessibility errors occurred as a result of images missing alt text, or, informative text that tells an Internet user what is being shown on the screen if the user cannot visually access the content.

Specific to U.S. institutions, Thompson, Burgstahler, and Comden's (2003) web accessibility analysis audited 102 public, four-year U.S. institutional websites. Engaging with the most robust web accessibility standards of the day, Thompson et al. (2003) evaluated each website using human evaluators who utilized several assistive technologies which have since been replaced with more advanced, modern technology. However, Thompson et al. (2003) was able to audit 1,103 different webpages across 102 unique institutional websites representing one of the most robust human evaluations of postsecondary websites to date. Of the most critical findings, Thompson et al. (2003) found that one human evaluator determined 182 webpages were web accessible and compliant with WCAG 1.0 standards, while a different human evaluator determined that only 40 webpages were WCAG 1.0 compliant using the same scale of web accessibility. Here, Thompson et al. (2003) reasoned that human evaluators may render different web accessibility judgements using seemingly objective criteria, speaking to the need for web accessibility studies to use a combination of human and machine evaluation to improve the accuracy and reliability of research findings in the field.

In the first longitudinal evaluation of the web accessibility of U.S. institutional websites, Hackett and Parmanto (2005) gathered web accessibility data from 1997 until 2002 across 45 institutional websites. All 45 institutions were members of the Association of American Universities and were considered elite, well-resourced institutions by the researchers. Hackett and Parmanto (2005) discovered that as Internet technology continued to evolve from 1997 to 2002, websites often be-

came increasingly inaccessible for people with disabilities, pointing to the necessity for regulatory laws to keep pace with advancing Internet technologies. These websites integrated the latest technology without ensuring that the communication on the website was accessible. Hackett and Parmanto's (2005) findings also foreshadowed the most recent Section 508 amendment that was an effort by the U.S. Congress 508 to minimize the impact of evolving technologies on the web accessibility of information for people with disabilities.

Shortly after 2002, the World Wide Web Consortium developed WCAG 2.0 standards, and Harper and DeWaters (2008) used these standards to analyze 12 four-year U.S. institutions. The researchers found that only one of 12 met Level AAA WCAG 2.0 standards, while another four of the 12 institutions did not comply with Level A, Level AA, or Level AAA. This theme of varying levels of WCAG compliance continued in the work of Flowers, Bray, and Algozzine (2011), as these researchers found 23% of a sample of 253 two-year institutional landing pages were accessible for students with disabilities and compliant with the most recent WCAG 2.0 standards. In a study which yielded even fewer WCAG compliant websites, Erickson et al. (2013) selected a random sample of 30 two-year institutions and learned less than 1% of these institutions' homepages adhered to Section 508 and WCAG 2.0 standards.

Extending the work using WCAG 2.0 standards, Thompson, Burgstahler, and Moore (2010) performed a longitudinal study akin to Hackett and Parmanto's (2005) foundational work. Therein, Thompson et al. (2010) embarked on a five-year study across 127 four-year U.S. institutions. The researchers found—echoing the findings of Hackett and Parmanto (2005)—that technology evolution rendered it difficult for institutional websites to maintain WCAG 2.0 compliance. Specifically, Thompson et al. (2010) noticed a rapid decrease in keyboard accessibility across the sample because of technology evolution, though web accessibility professional development and staff trainings helped marginally improve web accessibility. Yet, Thompson et al. (2010) asserted there was not a significant difference in the web accessibility of websites whose staff received professional development and training in web accessibility and those who did not.

Building upon the work of Thompson et al.'s (2003) study, Wisdom et al. (2006) interviewed staff working in Oregon community colleges regarding their knowledge of web accessibility. Wisdom et al. (2006) discovered that experienced, information technology (IT) staff and disability/student services staff held the most knowledge regarding disability laws and services, including web accessibility and WCAG standards. However, these IT and disability staff members did not often collaborate to share knowledge and ensure accessibility websites across multiple units on campus. Here, Wisdom et al. (2006) encouraged communication between campus units to share knowledge and collaborate with all members of a campus community in an effort to collectively improve web accessibility and disability services in general. In all, prior research has suggested U.S. institutions of higher education have struggled to publish and maintain web accessible websites given changes in technology (Hackett & Parmanto, 2005; Thompson et al., 2010) and a lack of professional development and practitioner knowledge of the subject (Thompson et al., 2003; Wisdom et al., 2006).

Most recently, Taylor and Bicak's (2019) analysis of community college web accessibility found that across a random sample of 325 community college websites, no single institution's landing page was free of WCAG 2.0 Level A errors. Similarly, Taylor's (2019) evaluation of the web accessibility of historically-Black college and university (HBCU) websites found that 94 of 100 HBCU websites were not ADA compliant and contained at least one WCAG 2.0 Level A error, with the average HBCU landing page containing 62 WCAG 2.0 errors.

Ultimately, given the nature of technology evolution and the lack of research focused on the web accessibility of Texas postsecondary websites, this study is timely. In addition, this study fills an important gap in the literature and evaluates the web accessibility of Texas higher education websites

to inform both the research community and practitioners on how to better support people with disabilities and their access of higher education in the state. As a result, Texas may be able to facilitate greater postsecondary access for students with disabilities, rendering the state of Texas a more equitable and inclusive one.

Methods

The following sections detail how the author identified the study's sample size, data collection and organization procedures, and how this study's limitations could inspire future research into the web accessibility of higher education websites.

Sample

Postsecondary institutions in Texas were selected for three reasons: size, population, and history. First, Texas is home to the fifth most postsecondary institutions (259), including three of the largest community college systems in the nation (Austin Community College, Houston Community College, and Lone Star College), and two of the country's largest public university systems (University of Texas System and Texas A&M System). Second, Texas is home to millions of native Spanish speakers, and the Texas legislature has drafted specific legislation to ensure that web content is readable or accessible for this population (Pew Research Center, 2014). Third, in recent years, the Texas Education Agency has struggled to meet federal guidelines and adhere to federal law concerning the education of students with disabilities in Texas schools (Kamenetz, 2018). Ultimately, postsecondary institutions in Texas constituted a large sample whose diverse population, educational landscape, and history justify this study and its aims.

Data Collection and Analysis

Postsecondary institutions in Texas were located using the Integrated Postsecondary Education Data System (IPEDS), a large database administrated by the U.S. Department of Education to allow researchers access to national-level data in one convenient online location (National Center for Education Statistics, 2018). As Section 508 pertains to institutions receiving Title IV funds, only Title IV institutions in Texas were included in the sample. An overview of this study's sample can be found in Table 1 below:

Table 1

Institutions of higher education in Texas, by sector (N=259)

Institutional sector	# of institutions (% of sample)
Public, four-year or above	47 (18.1%)
Private, not-for-profit, four-year or above	66 (25.5%)
Private, for-profit, four-year or above	29 (11.2%)
Public, two-year	60 (23.2%)
Private, not-for-profit, two-year	6 (2.3%)
Private, for-profit, two-year	51 (19.7%)

Once all institutions were identified, each institution's .edu landing page hyperlink was located using Google and cross-referenced with IPEDS to ensure only official institutional websites were analyzed and uploaded into a database. Landing pages were examined per Bradley's (2017) exploratory study focused on measuring the web accessibility of higher education websites, extending recent work in the field (Taylor & Bicak, 2019; Taylor, 2019). These landing page hyperlinks were inputted into Tenon (www.tenon.io), a robust web accessibility software program which runs 74 WCAG 2.0 tests of all four principles of web accessibility (operable, perceivable, understandable, and robust) at Level A, AA, and AAA to measure a website's web accessibility. Upon analyzing a hyperlink, Tenon reports on which Level A, AA, and AAA errors appear within the hyperlink's markup language, such as HTML5 or Java. Prior studies have also used Tenon to evaluate web accessibility, finding Tenon to be a robust and accurate software program (Taylor & Bicak, 2019; Taylor, 2019). Once Tenon was used to generate web accessibility error reports for each .edu hyperlink, these reports were merged into a database to organize the errors by institution sector (e.g., public or private, two- or four-year) and create the tables of findings.

Per Taylor's (2017a, 2017b, 2018a, 2018b) foundational studies in readability, the same .edu hyperlink was inputted into Readability Studio, a quantitative linguistics software program to measure the English grade-level readability of each homepage and to learn whether the homepages featured an embedded language translator, such as Google Translate or Adobe Muse. Readability levels were inputted into the database for analysis and organization of readability level by institutional sector. This database is available from the author upon request.

Limitations

This study's primary limitations are its sample size and the web accessibility auditing software used to analyze each institution's website. Although 259 institutions represent one of the most robust sample sizes of any web accessibility study in the field of U.S. higher education, institutions of higher education could vary from state to state or region to region. As a result, future studies should expand upon this study's sample size and analyze institutional websites from other regions and/or states in the United States. Moreover, there are hundreds of web accessibility auditing programs available at little or no cost, and related studies suggest that web accessibility studies could pair machine or software programs alongside human auditors to capture a more comprehensive understanding of web accessibility (Hackett & Parmanto, 2005; Taylor & Bicak, 2019; Thompson et al., 2003). Subsequently, future research could assess web accessibility using a combination of machine or software programs and human auditors to provide the educational community with a more in-depth and nuanced understanding of web accessibility, even though such studies would require much more time and a possible monetary investment depending on the software and human resources required.

Findings

The English grade-level readability, translation, and web accessibility of landing pages for postsecondary institutions in Texas (N=259) are displayed in Table 2 below:

Table 2

Descriptive statistics of readability, translation, and web accessibility of landing pages for institutions of higher education in Texas, by institutional sector (N=259)

Institutional sector	Readability mean, high, low, standard deviation (by grade level)
Public, nonprofit, four-year (n=47)	10.6, 16.1, 8.6, 1.3
Private, nonprofit, four-year (n=66)	10.5, 19, 7.6, 1.9
Private, for-profit, four-year (n=29)	12.8, 19, 9, 3.5
Public, nonprofit, two-year (n=60)	9.9, 16.5, 6.9, 1.6
Private, nonprofit, two-year (n=6)	10.7, 11.7, 9.8, 0.9
Private, for-profit, two-year (n=51)	11.5, 14.7, 7.9, 1.7

Institutional sector	Translation of landing page (% of population)
Public, nonprofit, four-year	2%
Private, nonprofit, four-year	3%
Private, for-profit, four-year	3%
Public, nonprofit, two-year	12%
Private, nonprofit, two-year	0%
Private, for-profit, two-year	2%

Institutional sector	Web accessibility errors (mean, high, low, standard deviation of errors per landing page)
Public, nonprofit, four-year	29.2, 242, 2, 38.1
Private, nonprofit, four-year	43.4, 281, 2, 40.7
Private, for-profit, four-year	33.8, 143, 8, 30.4
Public, nonprofit, two-year	47.6, 225, 6, 39.1
Private, nonprofit, two-year	30.2, 44, 10, 13.9
Private, for-profit, two-year	29.3, 109, 5, 18.9

Data in this study suggest private, for-profit, four-year institutions published the most difficult websites to read at the 12.8th-grade level, whereas public, two-year institutions published the simplest websites to read at the 9.9th-grade level. Public, two-year institutions were most likely to

include a language translator on their landing page (12%), although few institutions in this study translated web content for people who are not English fluent. Omitting a translator widget or failing to provide Spanish-language content may violate the Texas' EIR laws which govern polylingual online content provided by institutions of higher education. Finally, with regards to web accessibility, public, four-year institutions published the most web accessible websites with an average of 29.2 errors per landing page. No institutions in this study had fewer than two errors, and no institutional landing pages were Level AA-compliant per Section 508. However, it is notable that a number of institutions only had between two and eight WCAG 2.0 errors on their landing pages, very nearly achieving Level AA compliance.

Descriptive statistics of web accessibility errors by frequency and institution are displayed in Table 3 below:

Table 3

Descriptive statistics of web accessibility errors of landing pages for institutions of higher education in Texas, by error type and institutional sector (N=259)

Errors, by type, all institutions	# of errors, % of all errors (n=9,346)
Operable, Level A	3,964 (42.4%)
Robust, Level A	2,644 (28.3%)
Perceivable, Level A	1,738 (18.6%)
Understandable, Level A	425 (4.5%)
Operable and robust, Level A	340 (3.6%)
Operable, Level AA	134 (1.4%)
Perceivable, Level AAA	80 (.92%)
Perceivable and robust, Level A	20 (.28%)
Most common errors, by sector	First, second most common error type
Public, nonprofit, four-year (n=47)	Operable, Level A (691 errors) Robust, Level A (319)
Private, nonprofit, four-year (n=66)	Operable, Level A (1,062) Robust, Level A (913)

Table 3, Cont'd	
Private, for-profit, four-year (n=29)	Operable, Level A (301) Understandable, Level A (188)
Public, nonprofit, two-year (n=60)	Operable, Level A (1,342) Robust, Level A (668)
Private, nonprofit, two-year (n=6)	Operable, Level A (11) Robust, Level A (91)
Private, for-profit, two-year (n=51)	Operable, Level A (552) Robust, Level A (455)

The most common errors across all sectors were "Operable, Level A" errors, comprising 42.4% of all errors in this study. "Robust, Level A" errors were the second most common across all sectors except for private, for-profit, four-years institutions, in which "Understandable, Level A" errors were the second most common.

It is important to note that four WCAG 2.0 errors were responsible for most of the errors in this study's sample. Per Tenon's testing, there were 1,736 "Operable, Level A" errors in which hyperlinks had a title attribute that was the same as the text inside the link, leading to unnecessary wordiness for assistive technologies and offering no benefit to the user. Similarly, there were 1,369 "Robust, Level A" errors in which the landing page's ID attribute value was used more than once. This is problematic if the ID is being used to reference a user interface control, which can cause issues for users with assistive technologies. There were also 1,111 "Operable, Level A" errors in which links had no text in them, meaning that users could not use an assistive technology to access information about the link. Finally, there were 1,065 "Robust, Level A" errors in which a hyperlink had an invalid reference, meaning the user would be unable to use an assistive technology to learn whether that link led to another webpage, file, video, image, or other form of digital media. In all, these four Level A errors were responsible for 56.5% of all errors in this study.

Discussion

This study's findings answered both research questions. First, data in this study suggests that no single Title IV institution of higher education in Texas published an entirely accessible website by the designated date of January 18th, 2018 from the amendment to Section 508. Moreover, this study echoes recent research finding that college and university websites are rarely accessible for students with disabilities (Taylor & Bicak, 2019; Taylor, 2019). Speaking to litigation faced by other institutions across the country, a lack of web accessibility has provoked dozens of lawsuits after the January 18th deadline, alleging that Title IV postsecondary websites have not been accessible for people

with disabilities (McKenzie, 2018). From here, Texas institutions may be publishing inaccessible websites for people with disabilities, not only limiting the education potential of these students but also opening up the possibility that Texas institutions could face ADA-related lawsuits in the future unless they take notice and make changes.

Regarding the second research question, data from this study suggest Title IV Texas institutional websites may be readable by high school-educated audiences, but these websites are rarely translated into any other language beyond English and are not robust nor detailed enough for people with disabilities to access all of the digital content that non-disabled people could. Given the Texas' Electronic Information Resource (EIR) laws, these findings suggest Texas institutions are not supporting English-language learners or people with disabilities on their institutional websites—both are violations of Texas EIR laws and the Americans with Disabilities Act (1990). Subsequently, these findings may help explain the minoritization of English-language learners and people with disabilities in the state of Texas, perpetuating a hegemonic, exclusive system of higher education in the United States.

Connecting to prior research, Kelly's (2002) study found that many U.K. university websites failed to provide informative alt text for images, and this study also found many missing alt text attributes on Texas postsecondary websites. Similarly, Thompson et al. (2010) found that many web accessibility issues apparent on U.S. institutional websites involved a lack of keyboard assistive technology integration. This study also found that many WCAG 2.0 errors appeared on Texas postsecondary websites involving a lack of keyboard technology and assistive technology integration, echoing prior work (Taylor & Bicak, 2019; Thompson et al., 2010). Perhaps changing and evolving Internet technologies have continued to plague postsecondary websites as evidenced by Hackett and Parmanto (2005) and later Thompson et al. (2010), as it seems that Texas postsecondary websites suffer from the same shortcomings discovered in previous studies.

Thompson et al. (2010) learned that providing professional development and web accessibility training to staff did not drastically improve the web accessibility of certain institutional websites. However, such professional development and training seems essential to the livelihood of U.S. institutions of higher education, including those in Texas, given the amount of litigation faced by institutions (McKenzie, 2018). This study suggests that institutions of higher education in Texas ought to prioritize web accessibility and ensure that all practitioners with website editing permission are trained on how to best publish web accessible content. Beyond the threat of litigation, people with disabilities and people with home languages other than English may be routinely discriminated against due to a lack of accessible information online. If Texas postsecondary education desires to be an inclusive, supportive system (Texas Higher Education Coordinating Board, 2019), perhaps it is worthwhile to invest in web accessibility—and the people behind the building of the websites—in order to truly include and support people with disabilities and of diverse language backgrounds on their quest toward postsecondary education.

Implications for Practitioners

Data in this study suggest postsecondary institutions in Texas did not publish web accessible websites per WCAG 2.0 standards and federally-mandated Section 508 guidelines as of January 18th, 2018. Although many practitioners working in higher education are not web developers, nor do they have extensive experience in web accessibility, publishing a web accessible website can be achieved.

First, regarding readability, there are free and widely-available readability technologies that can allow practitioners to audit their web content for readability before it is published on an institutional website. A popular readability measure, the Flesch-Kincaid Grade Level Test, is built into every Microsoft Word program. Moreover, websites such as www.readable.io, allows users to upload

text into a fillable online form to learn how grade-level readable the text is before publication. In addition to English-language tests, the Gilliam-Pena-Mountain test (Gilliam, Pena, & Mountain, 1980) and Sol Spanish test (Contreras, 1999) are two common Spanish-language readability measures used to determine the grade-level readability of Spanish-language web content.

To produce native language content for English-language learners, Google Translate is free for practitioners to embed into their institutional websites with the help of their institution's web development team. Having been in use for over a decade, Google Translate has been proven to be nearly as accurate as human translators when translating English to Spanish, Chinese, German, and Italian (Tobin, 2015; Turner, 2016). Language translation technologies such as these will only continue to improve with use and other technological advancements; therefore, practitioners should consider employing these free technologies on their institutional website to render their website more accessible for an ever-growing population of U.S. postsecondary students: English-language learners (Pew Research Center, 2014).

Finally, no postsecondary institutions in this study published a Section 508 compliant website by the January 18th, 2018 deadline. Pilot studies have demonstrated how difficult web accessibility can be (Bradley, 2017). However, web accessibility technologies have advanced in recent years and many are now freely available and easy to use for those unfamiliar with web development and programming (Taylor, LaRonde, & Taylor, 2019; Taylor, 2018c). Tenon's web accessibility software (www.tenon.io) is simple to use and does not require much knowledge of web language. Yet, this technology is freemium, which means practitioners would need to purchase a license to regularly use the software (Taylor, 2018c). Alternatively, Deque Systems has created a web accessibility software tool called "aXe," which is a Chrome and Firefox browser add-on (Deque Systems, 2017). Users simply need to download the browser add-on, navigate to a webpage on their website, open the add-on, and learn which web accessibility errors they need to address with their web development professionals. These aforementioned tools are easy to use, inexpensive or free, and can work to make web accessibility a reality for students with disabilities across all postsecondary institutions in the U.S.

However, it is critical to note that institutional websites are only one form of communication. Improving web accessibility for minoritized populations, such as students with disabilities and English-language learners, does not address all forms of communication that these students rely on to access higher education and earn their degrees. Institutional web accessibility must be part of a larger, institution-wide initiative to improve communication in the written, verbal, and digital form to increase access to higher education for these student populations.

Conclusion

Ultimately, postsecondary institutions in Texas should immediately focus on the web accessibility of their websites to increase access to higher education for people with disabilities and English-language learners, specifically native Spanish speakers. Similarly, other states should heed the federal call for web accessibility and begin to evaluate how web content makes its way onto institutional websites. However, for as web (in)accessible as postsecondary websites may be, there exists a wealth of free, easy-to-use technologies to help practitioners make postsecondary education accessible for many minoritized people in U.S. society. For people with disabilities or English-language learners, successfully accessing postsecondary content on the Internet could make the difference between someone enrolling in an institution, earning their degree, and living a healthy and fulfilling life. In short, minoritized people should not have their educational dreams limited by inaccessible online information.

Of web accessibility, Bradley (2017) suggested that, "keeping higher education websites accessible is hard to do" (para. 1). However, given the findings of this study and emerging web accessibility resources, practitioners should not only work to comply with federal law but also work to make higher education truly web accessible, ushering in a new era of equity in higher education.

Z.W. Taylor, M.A., M.S., is a PhD candidate at The University of Texas at Austin. His research interests include linguistics in higher education, particularly pre-college information addressing first-generation college students and English-language learners. His work has been published by the *Community College Journal of Student Affairs Research and Practice*, *Journal of College Student Development*, and *Teachers College Record*, among others.

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