A High School Website Is a School Community's Communication Center…But Is It ADA Compliant?

John A. Huss

Abstract

As schools strive to function as communities, the inclusion of all stakeholders is paramount to establishing and maintaining an important sense of interdependency, equity, and access. In the effort to disseminate information as quickly as possible, however, U.S. high schools often neglect to ensure that their websites are accessible to those with disabilities and that they adhere to Title II of the Americans with Disabilities Act of 1990, the Individuals with Disabilities Education Act (IDEA), and Section 508 of the Rehabilitation Act of 1973. This study investigated the accessibility of 600 high school websites in Indiana, Kentucky, and Ohio by selecting a random sample of 200 schools per state and analyzing their home pages using WAVE (Web Accessibility Versatile Evaluator), which reports accessibility violations by annotating a copy of the page that was evaluated and presenting embedded icons and indicators to disclose breaches with ADA. Out of 600 schools, 390 had errors that need immediate attention, and all 600 schools had alerts. The most common compatibility infractions included missing alternative text, empty or confusing links, and issues with color contrast. This article gives practical suggestions for remediating many of the high impact errors, even for stakeholders without strong technical expertise.

Key words: website accessibility, disability, secondary education, high schools

Introduction

One would certainly consider a high school's website to be an important element of a school's attempt to develop and maintain an online community presence. While in the past it served on the margins as a promotional tool and general information exchange, the COVID-19 pandemic and subsequent transition to remote instruction quickly elevated the high school webpage to a place of prominence and necessity as an indispensable hub for students, parents, administrators, teachers, and citizens. However, in an effort to disseminate information as quickly as possible, schools often neglect to ensure that the website is accessible to those with disabilities. Simply put, web accessibility "involves making web content available to all individuals, regardless of any disabilities or environmental constraints they experience" (Mankoff et al., p. 41). In the case of a website, users should be able to perceive, comprehend, navigate, and interact with that webpage and its tools (World Wide Web Consortium, 2021). Web accessibility can further be broken down into four function-specific categories: perceivable, operable, understandable, and robust (King & Piotrowski, 2021).

Web accessibility encompasses all disabilities that affect access to the internet. Disabilities can range from auditory and visual to mobility, speech, and cognitive impairments. In order to retrieve materials from the school, individuals utilize assistance technologies that include screen readers, speech synthesizers, Braille output systems, screen magnification, and adaptive keyboards. Yet the design technique, programming, and aesthetics of much of the material make it incompatible with these devices and therefore inaccessible to the user. In such instances, the school website is not only grossly failing in its responsibility to be interactive and serviceable for all visitors to the site, but can also be liable from a legal standpoint. It is important, however, to point out that adding complex components to a page does not have to result in barriers to accessibility (Hackett et al., 2005).

Secondary schools that have not prioritized the accessibility of their online pages, mobile site, or applications may be discriminating against current and potential students, students' family members, alumni, job applicants, preservice teachers who complete field placements at the school, and any member of the public who accesses the school's information online (Cullipher, 2017). For example, high school students can meet multiple hurdles when they attempt to access student portals and resources like Carnegie Math, Khan Academy, Discovery Education, Infinite Campus, virtual libraries, individual teacher webpages, and links to homework assistance. Similarly, parents or guardians with disabilities can be impeded from downloading student handbooks and

forms or obtaining teacher and staff email, transcript requests, scholarship announcements, policy statements, calendars, supply lists, fee schedules, and online progress reports. The documents they access may likewise be out of compliance and thus difficult or impossible to read. If ever there was a time when schools needed to have good communication channels with their communities, this is it (Bentley, 2020). Americans with disabilities are about three times as likely as those without a disability to say they never go online (23% vs. 8%) because of the accessibility obstacles they encounter (Anderson & Perrin, 2017). In addition to those with established disabilities, there are individuals with temporary restrictions, such as a broken arm or wrist or someone recovering from a surgery, who need accommodations to ensure they can navigate the school's homepage (Coleman, 2021).

According to Title II of the Americans with Disabilities Act of 1990, the Individuals with Disabilities Education Act (IDEA), and Section 508 of the Rehabilitation Act of 1973, the content of websites is presumed to be incorporated under existing nondiscrimination laws, and websites of a covered "public accommodation" must be accessible (Podlas, 2015). School websites are often expansive, with a great number of departmental or extracurricular sections. Therefore, that accessibility applies not only to the navigation of the website itself, but also anything digital presented on the website, including PDF or Word files, mobile applications, audiovisual content, and school-generated video clips from third-party channels (Cullipher, 2017). Schools that do not provide their resources and systems in a universally accessible manner may be violating civil rights for a group that has been estimated to represent up to 12.6% of the U.S. population (Bialik, 2017). It is important to remember that the ADA is a strict liability law, which means there are no excuses/defenses, including ignorance, for violations (Rivenburgh, 2018). Quite simply, a U.S. Ninth Circuit Court of Appeals ruling holds that the ADA protects access to websites and apps, and web accessibility is no longer optional (MCD Partners, 2019). As a result, schools have faced an increasing number of Title II lawsuits filed through the U.S. Department of Education Office for Civil Rights (OCR) related to website accessibility. In fact, half of the civil rights complaints now pertain to disability discrimination, and, out of all complaints, those associated with Web accessibility for students with disabilities represent the most rising trend (Cullipher, 2017).

By way of contrast, peer-reviewed literature on the accessibility of PreK–12 websites, and more specifically secondary school websites, is extremely sparse and mostly dated. Klein et al. (2003) produced an early study of 157 public high schools in Iowa and, using the since-discontinued Bobby 3.2 software, reported that only 12 (7.6%) of the sites passed the Level A category of *Web*

Content Accessibility Guidelines 1.0 (World Wide Web Consortium, 1999). The failure to use alternative text to describe the content and function of website images and graphics accounted for over 90% of the compliance errors.

Studies that concentrated on a broader spectrum of organizational levels include a newer inquiry by Kimmons and Smith (2019) who compiled a sample of 6,226 K–12 schools from across the U.S. and conducted automated accessibility analyses of the school websites via the WebAIM WAVE evaluation tool. Results indicated that schools struggle to make their websites fully accessible to their universe of diverse users. Kimmons and Smith proposed the highest impact steps that schools nationwide need to take to improve accessibility include improving poor contrast between text and backgrounds, providing alternative text to images and other visual elements, and labeling form controls.

A small cluster of authors account for the remaining bulk of research on the topic. Krach and Jellenick (2009) employed WebXact (formerly Bobby 3.2) online software to determine compliance with federal mandates and reported only about 14% of individual K–12 school home pages and 17% of school district home pages were Web accessible. When data were aggregated by type of school, 17.6% of public schools were accessible compared to 7% of private schools. Bray et al. (2003) randomly selected 567 school district websites across the U.S. and Canada and evaluated them for accessibility. Findings revealed that 74% of the district home pages were found to have accessibility violations, with the preponderance of issues considered "high priority" in need of correction. Despite the "high priority" distinction, most infractions were considered to be easily rectifiable.

Bray et al. (2003) repeated the study to focus on only elementary school websites and reported that 57% of 244 randomly selected schools had at least one accessibility error. The priority areas were comparable to the ones revealed in the initial investigation: (a) not providing alternative text for images on the page, (b) not providing extended information for images that convey essential information, and (c) only using color to represent information. Similarly, Wells and Barron (2006) examined accessibility issues on 147 elementary school homepages using the WebXACT software in conjunction with the Accessibility Toolbar and determined only 16% to be accessible. The major sources of errors were related to text equivalents for images, small font sizes, screen resolutions, and contrast.

Bray et al. (2007) evaluated 165 randomly selected middle schools and found 58% of the websites to have at least one infraction, with most violations rated as severe and in need of high priority. Overall, 60 different types of accessibility issues were uncovered. The most common area of neglect (92% of pages) was in not identifying the language of the text on the home page.

Others involved color usage and insufficient contrast between foreground and background features, both of which are problematic for individuals with visual disabilities, including color blindness. A global suggestion was that all middle school webpages be encoded for meaning rather than appearance.

Perhaps the most comprehensive data available, albeit not high school nor PreK–12 specific, comes from WebAIM and the WAVE tool. In February 2019 and February 2020, WebAIM carried out an accessibility evaluation of the home pages for the top 1,000,000 websites (WebAIM, 2020). The evaluation was conducted using the WAVE stand-alone API (Application Programming Interface) tool. While the findings are comprised of only automatically detectable issues, the researchers considered the results depicted in Table 1 to be discouraging as to the current state of web accessibility for individuals with disabilities.

Table 1. Summative Findings for WebAim Accessibility Evaluation

Error	% Home pages in 2/20	% Home pages in 2/19
Low contrast text	86.3 %	85.3 %
Missing alt-text	66.0 %	68.0 %
Empty links	59.9 %	58.1 %
Missing form input labels	53.8 %	52.8 %
Empty buttons	28.7 %	25.0 %
Missing document language	28.0 %	33.1 %

Across the 1,000,000 home pages, 60,909,278 distinct accessibility errors were detected, which is an average of 60.9 errors per page. Users with disabilities would expect to encounter detectable errors on 1 in every 14 home page elements with which they engage. In total, 98.1% of home pages had detectable failures pursuant to the *Web Content Accessibility Guidelines*, an increase from 97.8% the year before (WebAIM, 2020).

It is important to note that the literature is also limited in that it discusses only the website accessibility violations that are uncovered through specific automated evaluation tools and therefore does not address the myriad of impactful issues that are outside the purview of a given instrument. For example, the design and development practice of using images of text as opposed to actual text (e.g., picture of monthly lunch calendar menus, students' rights and responsibilities, or a bell schedule) can interfere with screen readers because assistive technologies cannot read text embedded within an image. Other issues might include difficulties with keyboard navigation; inaccessible app portals; and the need for text equivalent for other non-text elements like buttons, icons,

or avatars. Although literature on the accessibility of school-related homepages is sporadic at best and largely incomplete, it does collectively point to a need for immediate improvement in how schools deliver information to their students and associates.

A theoretical construct that inspires the current study is the Web Accessibility Integration Model (Lazar et al., 2004), which isolates three primary influences on the accessibility (or lack thereof) of a website: societal foundations, stakeholder perceptions, and the quality of website development to support use by assistive technologies. Within societal foundations, the question of how much people truly value accessibility is posed. After all, the existing data on accessibility is distressing, yet such statistics do not seem to influence people to make more websites accessible or change the patterns of education. Similarly, if the stakeholders within a school community are not aware of or passionate about Web accessibility, then a web site will continue to be inaccessible. Thus, the societal foundations and stakeholder perceptions that exist within a given high school will clearly influence the actual Web development and determine whether delivery software applications and online content meet accessibility requirements, while adhering to the principles of legislative compliance. A related model known as the Tangram Model for Accessibility maintains that compliance with guidelines is undeniably a primary motivation, yet the aim should be explicitly on providing appropriate solutions for the user (Kelly et al., 2009). In both models, web designers are implored to extend beyond mere technical "access" and consider the true applicability of materials for individual visitors.

Purpose of the Study

The current study was undertaken to investigate the accessibility of high school websites throughout a tri-state region of Indiana, Kentucky, and Ohio, the states with closest proximity to the researcher's university and service area. The goal was to initiate a starting point from which those in secondary education can recognize and address the compliance needs for individual school websites, thus ensuring full and equal access for all members of the school community and beyond. Within the respective states, Indiana created Indiana Code 4-13.1-3 to ensure all state information technology equipment, software, and systems used by the public or state employees complies with the accessibility standards of Section 508 of the Federal Rehabilitation Act of 1973 (IN.gov, n.d.); Kentucky has adopted the World Wide Web Consortium's *Web Content Accessibility Guidelines 1.0* "Double A" Conformance Level as a guiding document (Kentucky Department for Local Government, n.d.); and Ohio conforms to State of Ohio IT Policy for Web Site Accessibility, IT-09, issued by

the Ohio Office of Information Technology (Ohio.gov, n.d.). Does this state level commitment transfer to the local school districts? The purpose was not to make head-to-head comparisons by state, but to gauge accessibility in a more cumulative sense and view the findings as part of a snapshot as to where high schools stand at this point in time insofar as their efforts to meet the school and school community needs. The researcher intended this inquiry as a needs assessment, service evaluation, and advocacy for students with disabilities and parents or guardians with disabilities.

The current study is particularly significant in that it represents the lone inquiry since 2003 to gather information on high school-specific websites. In addition, the early information on the high school environment was compiled with software that is long discontinued. Bobby 3.2 and the subsequent WebXact were the tools of choice, but even peer-reviewed evaluations at the time reported that "both tools are far away from having a good, automated coverage of the *Web Content Accessibility Guidelines*" (Centeno et al., 2005, p. 99). Fresh data are required to bring an updated perspective to the issue of websites and disabilities, especially with the new reliance on accessing school information in nontraditional ways. With tools and guidelines available to quickly correct many of the infractions, it is imperative that schools become both dedicated and aggressive in their commitment to ensure that the first introduction the community has to the school itself is a positive and successful online experience.

Methods

The researcher chose a sample of 600 high schools from Indiana, Kentucky, and Ohio—200 from each state—from Educationbug.org, an online educational web directory of all public school districts by state. The schools enumerated in the directory were then compared to the 2020–21 school indexes from the corresponding departments of education to validate that all high schools were represented in these master lists. A random number generator was utilized to select the first high school to comprise the sample from each state list. Systematic sampling with a fixed periodic interval of two then produced the desired number of 200 schools. The procedure was repeated for each of the three states. The systematic pattern was disrupted if a school website link was unavailable or nonworking. The selected school in question was then bypassed and the next high school on the list took its place with the two-school interval commencing at that point.

The homepage of each chosen school was located and then analyzed using WAVE (Web Accessibility Versatile Evaluator) provided through WebAIM. WAVE is an automated testing tool that provides visual feedback about the

accessibility of web content by generating icons and indicators onto a given page that conform to Section 508 and the *Web Content Accessibility Guidelines (WCAG) 2.1* (World Wide Web Consortium, 2018), which is an internationally recognized set of recommendations for improving Web accessibility that was released in 2018. It built upon the 2.0 version from 2008 and the seminal 1.0 inaugural version from 1999 that highlighted three levels of accessibility ranging from Level A (most basic levels of webpage accessibility) to Level 3 (enhances the user experience for those with disabilities). The violations are reported in a straightforward manner that make them easier to comprehend by most stakeholders within a school or organization.

After analyzing a web page, WAVE generates a report that highlights "errors" and "alerts." To distinguish, an "error" represents an almost certain accessibility issue, while an "alert" signifies a likely accessibility issue and a need for further investigation or improvement. An "error" can be equated with "Level A" or "Priority 1" as identified in *WCAG*. The presence of an "error" does not automatically equate to a wholly inaccessible webpage, but the component identified on the page isolates an accessibility issue that *will* impact the user. The analysis also posts the results from a color contrast checker because contrast and color use are vital to accessibility. Users, including users with visual disabilities, must be able to perceive content on the page (WebAim, 2017). Many website color designs and combinations can result in contrast that is insufficient for some readers.

In addition to highlighting violations and potential violations, the WAVE tool likewise recognizes the presence of ARIA (Accessible Rich Internet Applications) features and special accessibility attributes and interface components, which serve to acknowledge that accessibility features have intentionally been employed on the site. While this information is important and encouraging, detailed reporting of such features would extend beyond the scope of this study inasmuch as the focus is on those elements that pose significant barriers for users who seek to interact with a specific website.

The WAVE browser extension was itself recently evaluated and reviewed by Sparkbox, a renowned team of web designers and developers who tested the tool on a site that had planned accessibility issues (Godfrey, 2021). WAVE detected 62% of the errors that an automated system would be expected to find, including most of the more common computer-discoverable issues. After rigorous assessment on a 28-point checklist, the WAVE tool scored 25/28 and was deemed "highly recommended." Similar tools were likewise evaluated, including Pally (22/28) and Google Lighthouse (21/28), but WAVE was ultimately selected for the current study because it has been used to evaluate the accessibility of millions of web pages (Godfrey, 2021). Despite its utility, WAVE has

a published table titled "WAVE-WCAG Mappings" that lists the accessibility issues it covers and those it does not. WAVE functions well as an inaugural tool to point out basic accessibility violations within a school website but works best as a "conversation starter" to increase awareness and draw attention to the need for further exploration of a site in order to pinpoint other issues that may affect a user's ability to interact effectively with the school's page.

As noted, only the elements of the homepage were investigated for each school. Loiacono and McCoy (2006) felt that homepage evaluation was appropriate because visitors are most likely to enter through a homepage, and if the homepage is not accessible, the accessibility of the remainder of the site is largely irrelevant. In addition, the majority of software programs designed to examine accessibility (including WAVE) are not set up to evaluate multiple pages simultaneously. However, all Word or PDF files linked from the school homepages were inspected manually using either the embedded Word accessibility checker tool or Common Look PDF Validator (commonlook.com), a plugin for Adobe Acrobat that allows users to check PDF documents and forms to ensure compliance with the United States' Section 508 regulations and other accessibility standards. Audio files (podcasts, greetings, messages from school personnel) were investigated for the presence of text transcripts. Further, the NVDA (Nonvisual Desktop Access) screen reader was employed to double check content on those subsequent pages that were not accessed directly by WAVE. Upon securing a report for each individual site, findings were recorded on a spreadsheet.

Results

The results in Table 2 indicate the aggregate totals for each of the 600 schools by state and signify the total percentage of schools from each state that were shown to have at least one of the errors or alerts specified by the given column heading. As described previously, the WAVE tool draws attention to errors, alerts, and issues with the colors and contrast combinations utilized on the homepage. These findings are not intended to definitively assert if individual school webpages were ultimately accessible or not, but rather to identify the number of accessibility issues and potential accessibility issues that were uncovered so as to encourage secondary school personnel to actively increase their awareness of such barriers and begin to adopt a more holistic view of their own respective website's overall accessibility. Such judgments should be made by the schools themselves after careful inspection and not by the researcher.

Table 2. Errors, Alerts, and Contrast Violations by State

State	Errors	% of Schools	Alerts	% of Schools	Contrast	% of Schools
Indiana (n = 200)	1,220	72%	9,408	100%	1,990	80%
Kentucky (n = 200)	1,144	68%	7,780	100%	1,020	66%
Ohio (n = 200)	764	56%	8,120	100%	1,946	54%
Cumulative (n = 600)	3,128	65%	25,308	100%	4,956	67%

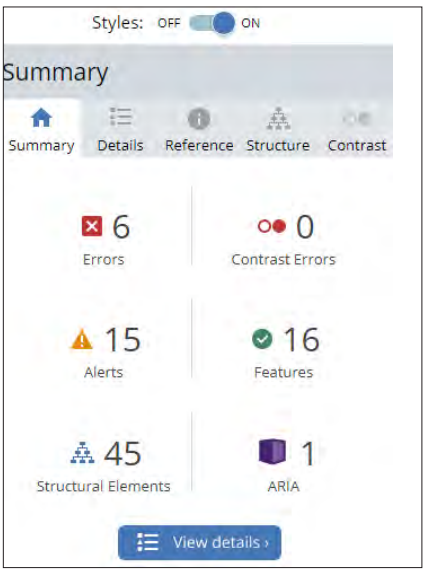
The summation data indicate an average of 5 errors, 42 alerts, and 8 contrast issues per page. To further extract the findings, Table 3 disaggregates the types and numbers of individual errors identified by the evaluation.

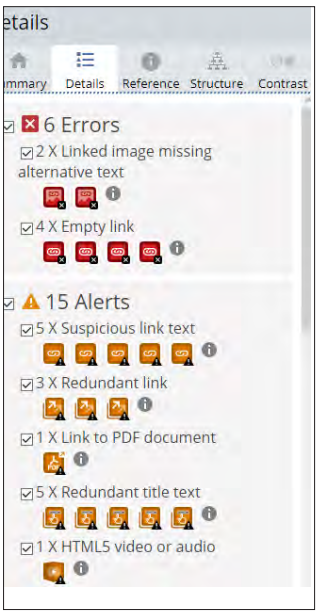
Table 3. Most Common Compliance Errors by Category

Error Type:	Alt Text	Empty Link	Empty Header	Missing Form Label	Other Assorted	Total Errors
Number:	2,164	350	200	194	220	3,128

To aid the reader, Figure 1 shows the actual report of a school website. The first graphic is the initial assessment, and the second graphic provides an overview of the violations detected.

Figure 1. Sample of WAVE Assessment Tool Report on a High School Webpage





In this instance, the 6 recorded errors dealt with two linked images missing alternative text and four empty links. The 15 alerts consisted of five suspicious links (link text contains extraneous text or may not make sense out of context), three redundant links, one link to a PDF document (PDF files often contain accessibility issues), five redundant title texts (Title attribute text is the same as text or alternative text), and one video or audio file that may lack proper captioning or transcript.

Most Frequently Occurring Errors and Alerts

When isolating the types of compliance issues found most frequently on the homepages, the overwhelming total dealt with missing alternative text (alt-text). The key principle is that computers and screen readers cannot analyze an image and determine what the image represents. Therefore, text must be provided to the user which describes the content and function, not merely the appearance, of the images. The various alt-text errors and alerts included images embedded on the page, linked images, and images within PDF or Word documents. As a subcategory, the use of *redundant* alt text was also extremely prevalent. Such an issue indicates alternative text is the same as nearby or adjacent text and will be presented multiple times to screen readers, thus making it difficult to discern the content of one image over another.

Empty links were prominent across the three states. When a link contains no text, the function or purpose of the link will not be presented to the user, which can generate confusion for keyboard and screen reader users. Closely related is the use of a poor link. An example is the common practice of using "click here." The link should clearly indicate to visitors using screen readers exactly what they will find without stating the obvious mechanics involved in the process (e.g., "The social studies curriculum guide is ready for download" or "Create your own study guide"). Another significant error involves missing form input labels. All features, such as text fields (e.g., search), dropdown menus, and check boxes must have labels that describe what is being asked of the user. Many instances of empty headers were also uncovered. If the heading is empty or the text cannot be accessed, it can prevent an individual from accessing information on the page. Heading tags are intended to inform the user as to what the content is about (Deque University, 2017).

Among the "other" category of errors were *skipped* level headings, wherein the hierarchy of heading levels (H1 H2, H3, etc.) is disrupted and, for instance, a Level 1 heading is followed by Level 3, with Level 2 being omitted. Headings provide document structure and facilitate keyboard navigation by users of assistive technology (Fercia, 2015). These users may be confused or experience difficulty navigating when heading levels are skipped. Empty buttons

were also frequently detected. When navigating to a button or any interactive element, descriptive text must be presented to screen reader users to indicate the function of the button. When examining a specific website, one may discover that the button contains an image, thereby appearing to *not* be "empty," but upon further inspection, one will likely find the image is lacking alt-text and is subsequently not detected by the screen reader.

The WAVE evaluation tool provides feedback on contrast issues as a separate category, and incidences of low contrast text throughout the sample of high schools was prevalent. Web sites should have a high color contrast between all text and the background color behind it. Low contrast text makes it more difficult for the reader to distinguish the shapes and edges of the characters, reducing reading speed and reading comprehension. This problem is emphasized as the text or font size decreases. Related to contrast is the overall ability to perceive content on a page. Most high school homepages have some type of colorful banner or marquee, often depicting the school name and sports logo. Text on a banner image, however, cannot be read by a screen reader; it also disappears if users turn images off in their browser settings. The text should always be coded in HTML format, either hidden behind the banner graphic or overlaying the banner graphic.

Although not classified as an "error," a particularly noteworthy "alert" involved the linking of a PDF file, because such files are often notorious for ADA breaches, including the document not being tagged and the lack of alt-text. In addition, schools may use the "print to PDF" option as opposed to "save as PDF," or scan a booklet, document, or file as an image, thus necessitating an optical character reader (OCR) and other supports. Closely related is the accessibility of non-html materials such as PowerPoint or Prezi, because slide presentations typically contain graphics, text saved as a graphic, animation, and narration that may require alt-text or transcripts. Checking documents and electronic presentations for accessibility *before* uploading them to the website or linking to them from the homepage is the recommended preemptive strategy.

Discussion

The findings demonstrate that ADA compliance for selected secondary schools within the three states has not been realized and that multiple compliance violations were uncovered that need to be addressed. Of the 600 high school websites that were evaluated, 390 had errors requiring immediate action, all 600 high schools recorded alerts, and 402 high schools had websites with contrast infractions. The errors found on the high school websites match up closely with the errors discovered across the websites examined in the large

WebAIM study. However, the percentage of high schools with errors in the current sample was 65% compared to the 98% of websites showing errors by WebAim. Perhaps most telling, however, was the apparent lack of overall progress made with secondary schools from the time of the Klein et al. (2003) study to the current study. The high prevalence of alt-text violations was apparent in both studies despite the significant time gap between them. Inaccessibility is both rampant and universal, and though some states might fare better than others in head-to-head comparisons, every state has room for improvement, as does almost every school (Kimmons & Smith, 2019). On the upside, the majority of the errors and alerts can be rectified very easily through awareness and action.

Recommendations for Tackling the Small Tasks

There are two components to consider when striving to improve accessibility. Some of the compliance issues may fall under "platform" and lie with the vendor who provides the school website. The other issues involve "content" and are the responsibility of those who contribute items to the webpage (eChalk, 2019). Thus, the first step in arriving at a remedy for high school websites with accessibility issues is to bring recognition of those issues to those who actually design the pages as well as the members of the school who produce items that ultimately become part of the webpage. These sites are often updated and populated by multiple people throughout the school or district, each with varying ranges of accessibility knowledge and skill. Different departments want their own specific contributions on the site, and the page often ends up being designed as much by organizational politics as by designers (Enginess, 2017). Thus, collaborative professional development involving professional Web developers, faculties, and staff members would be extremely beneficial, as a workforce with the necessary skills and confidence to implement accessibility is an *a priori* condition to the sustainability of institutional accessibility (Rowland, 2007).

Because content changes rapidly, it is critical to have a plan of accessibility that is proactive rather than reactive. Clearly, time spent on after-the-fact repairs is time that is taken away from meeting other needs of the organization (Groves, 2011). If a school discovers it has a larger number of compliance infractions, it is advisable to address the high-level violations as quickly as possible because they unmistakably affect the user's ability to perform important system tasks. While some high impact repairs may be more elaborate and technical, it is still prudent to use time efficiently and correct the "error" and "alert" items which often involve simple tasks like adding alt-text and ensuring that documents uploaded to the site do not have missing alt-text or headings. In this way, a school can facilitate quick improvements with minimal effort.

Because alt-text violations are so plentiful and so crucial for screen readers, they should receive priority attention. The exact process of adding the text may differ for each district or school's website, but it is imperative that common mistakes be avoided when crafting the text attributes. An example of a mistake might be an image of a tiger merely described as "tiger," as opposed to the actual function of that image, which is to depict the school mascot. Other images might inadvertently be described with the file name or number of the stock house from which they were downloaded, but not the content or function of that image. In these situations, an alt-text is, in fact, present, but it is insufficient. One should also be careful in hastily designating images as "decorative" when, in actuality, they serve a greater purpose in understanding the material in which they were embedded. For those with screen readers, an image marked in this manner is identified as "null" and is ignored by assistive technologies.

Manual Inspection and Hidden Compliance Issues

When the webpages were checked manually, close to 95% of Word or PDF documents that were attached on the pages were found to lack alt-text or to have improper usage of alt-text even when such attributes were allegedly present. Remediating such violations, as well as others, can generally be accomplished by taking advantage of accessibility checkers already present in programs like Microsoft Word and Adobe. For Word on a PC, select the "Review" tab and then click on "Accessibility Checker." To easily address accessibility errors and warnings, select an issue to open the "Recommended Actions" list. A user can then apply a one-click fix by selecting an action or selecting the arrow button next to an action for more options. For older versions of Word this feature will be found under File, Info, "Check for Issues." Inspection results will be produced that identify concerns and recommended fixes. By clicking on the warnings displayed in the inspection results, Word will take the user to the place in the document where the issue is found, thereby providing great assistance in not only showing users where there are issues, but also educating and informing them on the types of items a screen reader would have trouble speaking.

Adobe likewise has a built-in accessibility checker to aid in identifying and correcting issues within a PDF file. Using Adobe Pro, the user can navigate to Tools, and then "Accessibility." In the secondary toolbar, click Full Check/ Accessibility Check. By running a full check, the tool will return with results regarding the document's accessibility. Like Word, the Adobe tool will alert the user to issues with alt tags, spacing with tables, unclear hyperlinks, and more. The built-in accessibility tool is essential for administrators, teachers, or staff who use PDFs to post content on a webpage. Having the PDF created in an accessible way will ensure no issues when a screen reader is used.

Another issue that was uncovered through manual inspection was the absence of transcripts for audio announcements, greetings, principal messages, and podcasts. The task of developing transcripts for audio, videos, and screen captures can be quite tedious, but there are several open-source tools that are widely available and easy to use. Voice typing with Google Docs is available through Chrome for desktop as well as the Docs apps for Apple iOS and Android. If creating a podcast or transcript from scratch, Google Docs has a very helpful feature that will allow the user to generate a transcript as content is spoken. A microphone is required to utilize this tool. While using Google Chrome, Google Docs has a built-in feature located under "Tools" called "Voice Typing." When a new document is initiated, simply choose to start Voice Typing. The program will recognize the microphone and as the user begins speaking, it will type the text that it hears spoken. It recognizes punctuation commands such as comma, period, new line, and new paragraph. Additionally, it recognizes editing commands like select all, cut, copy, delete last word, and insert header. The voice recognition is very accurate and allows users to convey information without having to type a transcript at the same time. This transcript can then be shared, downloaded, or linked to a website.

Other external options are available as well. Dictation.io is a free online speech recognition software that will assist one in creating documents and transcripts in any language—without typing—using voice narration. Often a school website will feature a YouTube video of a board meeting, student news reports, and so on, and it would be helpful to have transcripts available of those videos instead of or in addition to the closed captioning provided. VidReader is a digital tool that generates English transcripts for YouTube videos using the captions already available in the video. By entering the URL for a YouTube video, anyone can use VidReader to create interactive transcripts. By initiating small steps such as these, a high school's website can move closer to accessibility in a shorter period of time and become much more valuable to all members of the community.

Limitations of Study

The high school web pages that were evaluated represented only a sample from their respective states, and the possibility of sampling error cannot be disregarded despite the attempt to ensure a random selection. Perhaps the most conspicuous limitation of the current study is the simple declaration that neither the evaluation tool nor the manual assessment of homepages are flawless processes able to detect every compliance breach found in the *WCAG 2.1* guidelines. Examples of overlooked issues might include keyboard accessibility; testing for responsive design and website display; functionality with voice

dictation; browser zoom and text resizing; and using color as the sole visual method for conveying content. In addition, the WAVE tool does not prioritize "alerts," so human interpretation and decision making are vital factors. The researcher did not make a final determination about the accessibility of specific webpages, but rather provided evidence to suggest that a majority of school webpages have accessibility errors that need to be fixed urgently and accessibility features that likely need improvement. It is highly recommended that school personnel make use of a comprehensive WCAG Website Accessibility Checklist to further guide their webpage analysis initiatives. Several such lists are available free of charge online.

Conclusion

There is little doubt that the pandemic and the pervasiveness of online instruction that followed in its wake has redefined content delivery within PreK–12 education and served to highlight the need for an accessible homepage for high school students, parents, teachers, administrators, and community members. A high school's website has increasingly become the interface for the school's community and a medium that facilitates the integration of all the school's operations in and outside the school walls (Lee, 2013). The researcher sought to provide essential, yet easily understood, data for secondary schools while emphasizing the need for being proactive with homepage development and maintenance. The responsibility to meet the needs of those in the school environment with disabilities is truly a collaborative venture, with pertinent stakeholders assuming accountability for the specific layers of the overall process that fall within that stakeholder's expertise or role within the high school. Tim-Berners Lee, credited with developing the World Wide Web, insisted: "The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect" (World Wide Web Consortium, 2021, para. 3). Therefore, those who are responsible for the daily operation of high schools across the country need to ask: "Is *our* website sending a message that all students and visitors are welcome at our school and accessibility is a priority?" Disability is often less a function of people's inability to perform certain tasks than it is a function of flaws in the design of the environment (Slatin, 2002). Many people consider the webpage to be a substitute for and representation of the face-to-face school environment (Sing, 2010). Members of the school community are likely attempting to access a school webpage at this very moment. First impressions matter.

References

Anderson, M., & Perrin, A. (2017). *Disabled Americans are less likely to use technology*. Pew Research Center. https://www.midlandscbd.com/articles/disabled-americans-are-less-likely-to-use-technology-3785

Bentley, K. (2020, November 9). *Schools up communications game during pandemic*. Government Technology. https://www.govtech.com/education/k-12/schools-up-communications-game-during-pandemic.html

Bialik, K. (2017, July 27). *7 facts about Americans with disabilities*. Pew Research Center. https://www.pewresearch.org/fact-tank/2017/07/27/7-facts-about-americans-with-disabilities/

Bray, M., Flowers, C. P., & Gibson, P. (2003). Accessibility of school districts' web sites: Descriptive study. *Information Technology in Childhood Education Annual, 1,* 209–221.

Bray, M., Flowers, C. P., Smith, S., & Algozzine, R. E. (2003). Accessibility of elementary schools' web sites for students with disabilities. *Education, 123*(4), 815–830.

Bray, M., Pugalee, D., Flowers, C., & Algozzine, R. E. (2007). Accessibility of middle schools' websites for students with disabilities. *The Clearing House*, *80*, 169–176. https://doi.org/10.3200/TCHS.80.4.169-178

Coleman, D. (2021, May 18). *Four benefits of Wordpress accessibility for your school*. Campus Press. https://campuspress.com/your-complete-guide-to-k-12-school-websites/#Chap5

Centeno, V., Kloos, C., Fisteus, J., & Alvarez, L. (2005). Web accessibility evaluation tools: A survey and some improvements. *Electronic Notes in Theoretical Computer Science*, *157*(2), 83–95.

Cullipher, V. (2017, November 28). OCR Website accessibility complaints hit schools and universities. *Digital Accessibility Digest.* https://www.microassist.com/digital-accessibility/school-website-accessibility-complaints/

Deque University. (2017). *Web accessibility classes and workshops*. https://dequeuniversity.com/curriculum/

eChalk. (2019, March 12). *School website accessibility OCR complaints continue to rise*. https://www.echalk.com/blog/2019/3/12/school-website-accessibility-ocr-complaints-continue-to-rise

Enginess. (2017, July 25). *8 key features for websites in the education section*. https://www.enginess.io/insights/8-key-features-websites-education-sector

Fercia, A. (2015, October 28). *Headings hierarchy changes in the admin screens*. WordPress.org. https://make.wordpress.org/core/2015/10/28/headings-hierarchy-changes-in-the-admin-screens/

Flowers, D., Bray, M., & Algozzine, R. (2010). Content accessibility of community college websites. *Community College Journal of Research and Practice*, *25*(7), 475–485. https://doi.org/10.1080/10668920152407874

Godfrey, B. (2021). *WAVE browser extension: Automated accessibility tool review*. Sparkbox.com.

Groves, K. (2011). *Prioritizing remediation of Web accessibility issues*. http://www.karlgroves.com/2011/06/12/prioritizing-remediation/

Hackett, S., Parmanto, B., & Zeng, X. (2005). A retrospective look at web accessibility over time. *Behavior and Information Technology*, *24*(6), 407–417.

IN.gov. (n.d.). *Accessibility*. https://secure.in.gov/core/accessibility.html

Kelly, B., Sloan, D., Brown, S., Seale, J., Lauke, P., Ball, S., & Smith, S. (2009). Accessibility 2.0: Next steps for web accessibility. *Journal of Access Services*, *6*(1&2), 265–294. https://doi.org/10.1080/15367960802301028

Kentucky Department for Local Government. (n.d.). *Accessibility policy*. https://kydlgweb.ky.gov/16_Accessibility.cfm

Kimmons, R., & Smith, J. (2019). Accessibility in mind? A nationwide study of K–12 web sites in the United States. *First Monday*, *24*(2). https://doi.org/10.5210/fm.v24i2.9183

King, C., & Piotrowski, C. (2021). Navigating the ADA accessibility requirements and legal pitfalls in online education. *College Student Journal*, *5*(2), 127–134.

Klein, D., Myhill, W., Hansen, L., Asby, G., Michaelson, S., & Blanck, P. (2003). Electronic doors to education: Study of high school website accessibility in Iowa. *Behavioral Sciences and the Law*, *21*, 27–49.

Krach, S., & Jelenic, M. (2009). The other technological divide: K–12 Web accessibility. *Journal of Special Education Technology*, *24*(2), 31–37.

Lazar, J., Dudley-Sponaugle, A., & Greenidge, K. D. (2004). Improving web accessibility: A study of webmaster perceptions. *Computers in Human Behavior*, *20*, 269–288.

Lee, M. (2013). School websites as indicators of school's evolutionary position. *Educational Technology Solutions*, 55.

Loiacono, E. T., & McCoy, S. (2006). Website accessibility: A cross-sector comparison. *Universal Access in the Information Society*, *4*(1),393–399.

MCD Partners. (2019, October 14). *Supreme Court rules ADA protections apply to websites*. https://www.mcdpartners.com/news/supreme-court-rules-ada-protections-apply-to-websites

Mankoff, J., Fait, H., & Tran, T. (2005). *Is your web page accessible? A comparative study of methods for assessing web page accessibility for the blind*. Proceedings of the SIGHI Conference on Human Factors in Computing Systems, 41–50.

Ohio.gov. (n.d.). *Accessibility*. https://ohio.gov/wps/portal/gov/site/help-center/accessibility

Podlas, K. (2015). Website accessibility and the Americans with Disabilities Act. *Journal of Internet Law*, *19*(5), 3–16.

Rivenburgh, K. (2018, November 7). *The ADA checklist: Website compliance guidelines in plain English*. Medium. https://medium.com/@krisrivenburgh/the-ada-checklist-website-compliance-guidelines-for-2019-in-plain-english-123c1d58fad9

Rowland, C. (2007). Case studies in training and professional development for web accessibility. *ATHEN E- Journal*, *2*. https://athenpro.org/node/42

Sing, P. (2010, November 29). *Importance of website in schools.* Ezine Articles. https://ezinearticles.com/?Importance-of-Website-in-Schools&id=5463541

Slatin, J. (2002, Spring). The imagination gap: Making web-based instructional resources accessible to students and colleagues with disabilities. *Currents in Electronic Literacy: Computers, Writing, Research, and Learning in the Lab*, *6*.

WebAim. (2017). *Web Accessibility Evaluation Tool*. http://wave.webaim.org/about

WebAim. (2020). *The WebAim million: An accessibility evaluation of the top 1,000,000,000 home pages*. https://webaim.org/projects/million/2020

Wells, J., & Barron, A. (2006). School web sites: Are they accessible to all? *Journal of Special Education Technology*, *21*, 23–30.

World Wide Web Consortium (W3C). (1999). *Web Content Accessibility Guidelines 1.0*. http://www.w3.org/TR/WCAG10/

World Wide Web Consortium (W3C). (2018). *Web Content Accessibility Guidelines 2.1*. https://www.w3.org/TR/WCAG21/

World Wide Web Consortium (W3C). (2021). *An introduction to web accessibility*. Web Accessibility Initiative. https://www.w3.org/WAI/fundamentals/accessibility-intro/

John Huss is a professor of education at Northern Kentucky University, where he teaches foundations of education and action research courses. His interests include middle and secondary level education, pedagogy of humor in teaching, and online learning. Correspondence concerning this article may be addressed to Dr. John Huss, College of Education, Northern Kentucky University, Highland Heights, Kentucky 41076, or email hussj@nku.edu