A Survey of the Texas Public School System Websites' Accessibility Errors and Solutions

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ABSTRACT

As the World Wide Web becomes one of the main communication channels between school districts and their community of stakeholders, the need to provide equal access and equal opportunity to people with disabilities is no longer just an ethical issue but a legal obligation. This paper tests the Texas public school using the Bobby Software against section 508 guidelines and Web Content Accessibility Guidelines (WCAG). Each error is analyzed and the corresponding solution is given.

Keywords: Accessibility, WCAG, Section 508

1. INTRODUCTION

Nowadays, Internet plays an increasing integral role in education for delivery of academic, administrative, and student services. The web pages often contain important information about academic resources, campus events, and administrative policies. The Texas school system supports approximately 4.5 million students, among them, 486,887 (10.6%) are classified as special needs [1], and it is a significant portion of the users for the Texas school system. The Texas school system should ensure that all students have equal access to equitable education and programs [12].

1.1 Web Accessibility Standards

Web accessibility is rooted in two sets of guidelines: Section 508 of the Rehabilitation Act and the Web Content Accessibility Guidelines (WCAG). Section 508 is mandated by law and applies to all websites of federal agency and organizations that receive federal monies [10]. While not backed by law, the WCAG is part of the World Wide Web Consortium's (W3C) Web Accessibility Initiative [5], and it plays a critical role in establishing website accessibility standards.

Section 508 consists of 16 paragraphs that focus on dissolving barriers that inhibit persons with disabilities from accessing information technology (IT) resources. Currently Section 508 only applies to the federal government or businesses and organizations that receive federal monies [7]. By extension, this implies that all state governments and their respective agencies including the Texas public school system.

Unlike Section 508, Web Content Accessibility Guidelines (WCAG) is not required by law. WCAG provides a set of checkpoints that web developers may follow to ensure that their sites are accessible to a wide variety of users. WCAG defines three levels of web accessibility, Priority 1 (P1), Priority 2 (P2), and Priority 3 (P3). The priorities do not cascade, therefore, a site may meet all the requirements of P3 and still fail to meet the P1 and P2 requirements. Each WCAG priority consists of various guidelines. Fourteen guidelines make up the WCAG framework. Each guideline is broken down into individual checkpoints.

The Section 508 and WCAG guidelines share a several common requirements. Thirteen out of sixteen paragraphs of Section 508 could be found in P1 and P2 guidelines. However, it solidifies the need for web pages accessibility moves beyond Section 508, and achieve higher accessibility by implementing P1, and P2.

1.2 Review of the Literature

A number of studies have evaluated the accessibility of selected web pages at institutions of higher education. Schmetzke had completed the 56 North American colleges that offer ALA-accredited programs in library and information science [9], and the home pages of 1051 community colleges [8]. He found that 77 percent of university and community college web pages contained at least one accessibility error. [6] evaluated a random sample of 400 U.S. prominent colleges, universities, and online learning institutions, and found that fewer than 25 percent of university home pages met the minimum accessibility criteria.

In addition, some literatures revolve around of how to achieve web accessibility. [11] emphasized that dissemination of accessibility standards and adoption of accessibility guidelines by web authoring tools are not enough. They argued that web pages should be viewed in a much larger social context and that the role of the web page cannot be separated from its accessibility. [4] also

argued that web accessibility needed to be included in the design process rather than be a post-design process.

2. RESEARCH METHODOLOGY

In this paper, an assessment of the Texas public school system web sites is conducted and measured web accessibility against Section 508 guidelines and WCAG P1 and P2. Each error is analyzed and the corresponding solution is given.

2.1 Evaluation Methods

The primary tool used in this paper is the WatchFire Bobby Software [6, 9]. Bobby allows the users to scan entire websites or single web pages. All pages could be compared to 508 guidelines and all three priorities of the WCAG. Because many of the 508 and WCAG priorities are subjective, only the objective errors produced by Bobby were recorded. For example, evaluation software can easily be tested to verify that all images have alternate text (paragraph a); however, it is more difficult to verify that a site is readable without its associated style sheet (paragraph d).

2.2 Web Standard Formats

Web standards refer to the construction and form of a web page's Extensible HyperText Markup Language (XHTML) and Cascading Style Sheet (CSS) documents. When a web site or web page is described as complying with web standards, it implies that the site or page has valid, well-formed XHTML and CSS. The XHTML should also be semantically marked up.

Code samples used for this paper will use the following format. Fixed Width fonts for all XHTML and CSS code are used. All XHTML, except that taken directly from a school district's website, will conform to XHTML well formed markup: `<elementName attribueName="attributeValue">text</elementName>`. The purpose of this research is not focused on web standards; however, web standards, which include well-formed XHTML, are used as solutions to many of the accessibility issues found. This research is to find the state of Texas school system websites' errors and how to modify them in compliance with accessibility standards.

3. ERRORS AND DISCUSSIONS

The paper investigated 1257 Texas school entities, including all local school districts, region centers, and TEA. For ease of understanding, the analyses have been broken down into three parts: 508 guidelines, P1 and P2 of the WCAG.

3.1 Section 508 Guidelines

Paragraph (a) and priority 1 1.1 alternate text. Paragraph (a) requires that a text equivalent for every non-text element is required. All web images can be categorized into three groups: design and layout, links, and information. Based on the category of images being used, a different approach to accessibility will be used. Abbott ISD (http://www.abbottisd.org/) uses two categories of images on its home page: links and design and layout.

```
    <td height="77" width="33%">
        <p style="margin-top: -2px;
    margin-bottom: -2px;"
    align="center">
        <a
href="http://www.abbottisd.org/aboutschool.
htm">
    <img
src="Abbott%20ISD%20LINK%20508%20a_files/pa
w.gif" border="0" height="46"
width="48"></a></p>
        <h2 style="line-height: 100%;
margin-top: -2px; margin-bottom: -2px;"
align="center">
        <font size="3">
        <a
href="http://www.abbottisd.org/aboutschool.
htm">
        <font color="#ffcc00">About our
School</font></a></font></h2>
    </td>
```

From the code sample above we can see that Abbott uses an image (`paw.gif`) as part of a link to (http://www.abbottisd.org/aboutshool.htm), titled `About our School`. The first accessibility issue is the lack of alternate text associated with the paw.gif image. This can be easily remedied with the following code to satisfy the Section 508.

```
    <img
src="Abbott%20ISD%20LINK%20508%20a_files/pa
w.gif" alt="Paw" border="0" height="46"
width="48" />
```

However, users with visual impairments object to listening to descriptions of decorative elements. The paw image is used merely as a link and offers no meaning to the web page. Another solution to this issue is the use of web standards. By "hiding" the link image in a CSS document a designer is able to achieve the same design with much cleaner XHTML. Below is the corrected code sample split into two parts: first part is the associated CSS document followed by the revised XHTML.

```
    #navigationtabs a:link#current,
#navigationtabs a:visited#current
    {
        background: url(../images/paw.gif);
    }
```

```
    #navigationtabs a:active,
#navigationtabs a:hover
    {
        background: url(../images/paw.gif);
    }
```

The associated XHTML code that references the navigation ids created in the above CSS document.

```
    <div id="navBar">
        <ul id="navigationtabs">
               <li><a
href="aboutschool.html">About our
School</a></li>
        </ul>
    </div>
```

By employing this method, a designer is able to create a page that is accessible and avoids "tricks" such as leaving alternate text as an empty space or using alternate text with little or no meaning. Abbott ISD also uses an image as a design and layout element, which can be easily remedied by adding the "alt" attribute to the "img" element.

```
    <img
src="Abbott%20ISD%20LINK%20508%20a_fil
es/abbott_panther.gif" alt="Panther"
align="left" border="0" height="213"
width="331" />
```

However, when viewing the code from the aspect of a blind user, it is easy to see that the text "panther" offers no value to the content of the web page. Furthermore, the image is used for design purposes and, as such, should be "hidden" behind the CSS to help avoid confusion. Below is the code sample using web standards and CSS to create the same design.

CSS Code:

```
div.pantherImage{
  background-image:url("abbott_panther.gif");
  background-repeat:no-repeat;
  height:300px;
}
```

XHTML Code

```
<div class="pantherImage">
 
</div>
```

By using web standards, a designer is able to avoid creating meaningless alternate text for images that do not offer meaning to a web page's content. Alternate text is an accessibility tool and should not be used to benefit the designer. Alternate text should be used to clarify content [13]. Finally, for those images that do provide content to a web page, the designer must choose alternate text that adds to the content. Alternate text should be succinct and meaningful [3].

Paragraph (i) and priority 1 12.1 ensure each frame is titled. The text should allow users to identify the content of the frames as quickly and succinctly as possible. In order to make the web page compliant with 508, the "title" attribute must be added to the "frame" element. However, the issue is deciding what text should be included in the "title" attribute. Frame titles give the user information about the contents of the frame. Below is the corrected accessible code where bold part is added to fix the problem (http://www.blandisd.net/).

```
         .
    <frame name="contents" target="main"
src="Bland%20ISD%20Home_files/bisd_left_nav
.htm" scrolling="auto" title="Navigation">
    <frame name="index_body"
src="Bland%20ISD%20Home_files/index_body.ht
m" target="_self" scrolling="auto"
title="Welcome Page">
```

Paragraph (n) and priority 2 12.4: associate form controls with label elements. Paragraph (n) defines a framework for how XHTML forms should operate. An XHTML "label" element specifically associates the label's text with the form control. Because of this association, browsers are better able to indicate to users which label applies to which form control. The following code is taken from the Merkel ISD website (http://www.merkel.esc14.net/). Because the "input" element is missing an associated "label" element it may be difficult for some users to understand the purpose of the form control. The additional "id" attribute and the "label" element with its associated "for" attribute is required.

```
    <label for="search">Search</label>
    <input type='text' name='q' size='14'
maxlength='255' value style='font-size:
8pt' id="search">
```

3.2 P1 Priorities

Priority 1 and Section 508 share many common guidelines. We have already discussed P1 1.1 and P1 12.1. The remaining priority 6.2 pertains to frame sources.

Priority 1 6.2 ensure that frames reference a file. WCAG requires that each frame reference an XHTML file. If a frame must reference an object, such as a picture or applet, the frame should reference an XHTML file that has the object embedded within it. In the code sample below from Red Oak ISD it can be seen that the frame references a gif image (http://www.redoakisd.org/).

```
    <iframe id="RSIFrame"
name="RSIFrame" title="Please Ignore"
style="width:0px; height:0px; border:
0px" src="/images/empty.gif"></iframe>
```

For the page to pass accessibility testing, a separate XHTML file must be created and referenced from the "frame" element using the "src" attribute. Below is the corrected code sample referencing the new XHTML file.

```
    <iframe id="RSIFrame" name="RSIFrame"
title="Please Ignore" style="width:0px;
height:0px; border: 0px" src="empty.html
"></iframe>
```

The new XHTML file below does not contain content. It exists solely for holding the image that was directly referenced in the original code from Red Oak ISD.

```
    <!DOCTYPE html PUBLIC "-//W3C//DTD
XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
    <html
xmlns="http://www.w3.org/1999/xhtml">
    <head>
    <meta http-equiv="Content-Type"
content="text/html; charset=iso-8859-1"/>
    <title>EMPTY FILE</title>
    </head>
    <body>
        <img src="/images/empty.gif"
alt="Blank Image" />
    </body>
    </html>
```

3.3 P2 Priorities

WCAG P2 represents the largest set of guidelines that can be explicitly tested. Some of the errors can be resolved by abstaining from using deprecated XHTML elements and relying on CSS to achieve desired design effects. Many of the problems can be solved in a similar manner to the paragraph (a) errors.

Priority 2 3.2 provide a document type declaration. WCAG 3.2 requires that a document type declaration (DTD) be included at the beginning of an XHTML document. The DTD allows browsers to interpret the markup correctly and display the appropriate features within the document. Tyler ISD does not include a DTD (http://www.tylerisd.org). Below is a sample DTD referencing the XHTML 1.0 Transitional document type.

```
    <!DOCTYPE html PUBLIC "-//W3C//DTD
XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-
transitional.dtd">
```

Priority 2 3.4 use relative sizing. Most objects can be sized with relative or absolute size units. Absolute units like pixels, points, and inches are based an absolute unit of measure and, therefore, cannot be scaled. Relative units including percentages and em(s) (a unit of width relative to a font size) will be scaled. This scaling allows objects to change size based on the user's resolution. It is important that web content be able to shape itself to the viewing area of any user. Some users may have large monitors; some may have small handheld devices, etc. A code sample from Tyler ISD indicates that a table is sized using absolute dimensions.

```
    <td width="350" height="107"
valign="top">
```

The width of 350 refers to 350 pixels and the height of 107 pixels. To fix the code, the designer must be able to convert the absolute measurements into percentages. If a page size should be viewed as 800 pixels then the width of the table should be 350 / 800 or 44%. The "height" attribute should be left off. Below is the corrected code.

```
    <td width="44%" valign="top">
```

Priority 2 3.5 properly nest headings. P2 3.5 requires that all heading elements be properly nested. This requirement means that an "h1" element should be followed by an "h2" element, and so on. In the following code sample from Coupland ISD it is easy to see that an "h3" element directly follows an "h1" element (http://www.couplandisd.org).

```
    <h1 align=center style='text-
align:center'><span
style='color:#000099'>Elementary</span
></h1>
    <h3 align=center style='text-
align:center'><span
style='color:#669900'><a
   href="http://teacherweb.com/TX/Coup
landSchool/Wheeler/index.html">Kinderg
arten<br>
    Mrs. D. Wheeler<br>
    </a><a
href="mailto:dwheeler@couplandisd.org"
><span style='font-size:10.0pt'>Send
    Email</span></a> </span></h3>
```

To comply with P2 3.5 the "h3" element must be changed to an "h2" element. This change ensures the proper nesting of heading elements required.

Priority 2 6.5 define a no frames area. P2 6.5 requires that pages that utilize frames must define a no frames area using the "noframes" element. Looking again at the code sample from Bland ISD the webpage uses the "noframes" element (http://www.blandisd.net/).

```
    <noframes>
    <body>
    <p>This page uses frames, but
your browser doesn't support them.</p>
    </body>
    </noframes>
```

Priority 2 7.2 and 7.3 avoid blinking and marquee text. Blinking text and marquee text are discouraged in P2 7.2 and 7.3 respectively. Both the "blink" and the "marquee"

elements are deprecated and not considered part of XHTML 1.0. As such, the best way to resolve these conflicts is to avoid them in the design of a web site. If blinking text or marquee text is required, it would be better to create an animated gif image to display the information.

Priority 2 7.4 and 7.5 avoid auto refresh and auto redirect. Users who access a page using a screen reader, or people who are not able to read quickly may experience problems if a page is set to auto-refresh after a set amount of time. P2 7.4 requires that pages do not auto-refresh. The code below from ESC 2 has set the page to reload after 1800 seconds (http://www.esc2.net/).

```
<meta http-equiv="refresh"
content="1800" />
```

The only way to remedy the problem is to remove the code from the web page. If designers must use auto-refresh, it is advisable to provide a line of text at the top of the page stating that the page will auto-refresh after X number of seconds. For the same reason, it is not advisable to have a page auto-redirect to another page. An example of auto-redirect is given in the code sample below from the Texas School For The Deaf (http://www.tsd.state.tx.us/).

```
<script
src="Scripts/AC_RunActiveContent.js"
type="text/javascript"></script>
    <noscript>
    <meta http-equiv="Refresh"
content="1;URL=http://www.tsd.state.tx.us/i
ndex_nojava.html" />
    </noscript>
```

Priority 2 9.3 provide event handlers. Event handlers respond to user actions. Disabled users who suffer from fine motor impairments may not be able to manipulate the mouse. The following code from Lufkin ISD contains the "onmouseover" handler (http://www.lufkinisd.org/). Because this handler requires the use of the mouse, the code should use the "onfocus" handler. Using both allows the user to interact with the web page in a device-independent manner.

```
sfEls[i].onmouseover=function()
```
The following code is corrected to include the "onfocus" handler.
```
sfEls[i].onfocus=function()
```

Priority 2 13.1 use contextual link text. Designers should not use link phrases like "click here" as link text. Using link text that is not descriptive enough requires that users read the surrounding text in order to decipher the link. Designers should use link text that is sufficient to stand on its own.

Priority 2 13.2 provide a document title. The "title" element is used to title a web page, and is used by the browsers to put in the title bar of the page window where it is quickly accessible. Beyond accessibility, search engines use the title of the page to create the link on the results page. Colorado ISD does not have a document title as required by P2 13.2 (http://www.ccity.esc14.net/). The original school district code, as well as the corrected code is below.

```
<head>
    <meta http-equiv="Content-Type"
content="text/html; charset=windows-
1252">
    <link rel="shortcut icon"
href="images/favicon.ico" >
    </head>
```

The corrected code will enclose the title of the webpage within the "title" element. The same care in choosing alternate text for images should be given to choosing an appropriate title for a web page.

```
<head>
    <meta http-equiv="Content-Type"
content="text/html; charset=windows-
1252">
    <title>Colorado ISD</title>
    <link rel="shortcut icon"
href="images/favicon.ico" >
    </head>
```

4. CONCLUSION

As websites become the defacto form of communication between school districts and their community of stakeholders, it is increasingly more important to provide equal access to online resources. The entities within Texas public school system against section 508 guidelines and WCAG is tested. Each error is analyzed and the corresponding solution is given. The growing awareness of web accessibility should be introduced to all educators, web developers, and website designers.

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