Understanding Blind User’s Accessibility and Usability Problems in the Context of myITlab Simulated Environment

Completed Research Paper

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Abstract
Universities are increasingly adopting online training and assessment tools such as Myitlab. Often, these tools pose accessibility barriers to the blind and visually impaired (BVI) students. As a first step towards developing a technology policy to accommodate BVI students in classroom, this paper investigates accessibility and usability of myITlab online environment for the BVI. The investigation adopts a task-oriented, user-centric, multi-method evaluation approach (Babu et al, 2013). The results reveal problems such as use of inappropriate text alternatives, use of nested tables, and inconsistency in the user interface, inadequate keyboard operability, inappropriate reading order, and inappropriate instructions. The presence of critical accessibility and usability issues suggests a probable misalignment in the product accessibility life cycle processes. It also suggests the need of involving users with disabilities in product design and evaluation to ensure that, the intrinsic accessibility functionality of the product is accessible and usable.

Keywords
Accessibility, usability, blind, myITlab, educational accessibility, accessibility testing, Pearson.

Introduction:
Important learning outcomes in universities are enabling the students to use technology in context of their professional responsibilities (Hollister & Koppel, 2007). Therefore, helping students to achieve proficiency use of business applications such as word-processing, spreadsheet, and presentation is an important part of the curriculum to improve employability of the students (Wolk, 2008). The need for proficiency with business application is equally important for the blind and visually impaired (BVI) students. Over 25 million Americans are blind and visually impaired (BVI). Of which 1.5 million BVI are computer users and 5 million have less than a high-school diploma (American Foundation for the Blind, 2013). Assistive technologies like screen-reader and screen-magnifier are empowering the BVI to computer literacy and many are pursuing university education. Universities will need to increasingly cater to the accessibility needs of these individuals.

Traditionally training in computer applications comprised lecture and lab assignments in the particular application (Mykytyn, Pearson, Paul, & Mykytyn, 2008). However, recently many universities have turned to assessment and training tools such as myITlab, SAM, SimNet and SNAP (Hill, 2011; Morris, 2010). These tools require students to complete various tasks in a simulated environment. These training tools
used to be computer-based. With advancements in internet and communication technology (ICT) these tools have transformed into web-based. Universities adopt these tools for implementing assurance of learning (AOL) standards mandated by the accreditation of business schools (AACSB). These tools enable setting the program learning goals, measuring the objectives across time, and continuing improvement (Al-Mubaid, Abeysekera, Kim, Perkins-Hall, & Yue, 2011; Hollister & Koppel, 2006). These tools obviate the need for physical classrooms and enable Universities to deliver the curriculum to any connected computer. This empowers the BVI students. However, research shows that, learning technologies, and other ICT, are designed for sighted interaction (Bradbord and Peters, 2008). They present significant, often insurmountable accessibility barriers for BVI (Hailpern, et al., 2009; Cooper, 2007). These barriers require greater time and effort for BVI to interact with the tools and often make them depend on sighted assistance (Babu et al, 2010). Therefore, at the Bryan School of Business and Economics, we engage in understanding accessibility and usability challenges posed by myITlab online environment to appropriately accommodate BVI students.

Earlier research has investigated accessibility barriers posed by online environments like Blackboard (Babu and Singh, 2009) and SharePoint (Kulkarni, 2010). However, myITlab is an online environment, affording its users a simulated experience of using software applications not provided by either Blackboard or SharePoint. Therefore, accessibility problems posed by myITlab are unique and worthy of investigation. The outcomes of this research would be the first step towards informing the University policy for providing reasonable accommodations to a disabled student and the policy of digital infrastructure procurement.

**Research Design:**

We adopted a task-oriented, user-centric, multi-method evaluation approach (Babu et al, 2013) to answer the research question. Unlike quantitative methods, which are interested in producing generalizable results, qualitative methods are used to study human behavior and behavior changes in a particular context. Our investigation was situated in the intersection of unique BVI users and the context of interacting with myITlab. We were interested in producing in-depth understanding of accessibility and usability issues faced by the BVI. Therefore, we chose to collect qualitative evidence. We were specifically interested in evaluating usability and accessibility of the simulated quiz, objective quiz, and eText sections of myITlab. We created a mini course which contained both types of quizzes and the eText. We used the think-aloud method of direct observation, also called concurrent verbal protocol analysis, to collect concurrent verbal reports of BVI students. Participants work on a task and concurrently verbalize whatever they are thinking (Ericsson & Simon, 1984; Todd & Benbasat, 1987). Concurrent verbal reports contain evidence of the information that participants process to perform a task (Ericsson & Simon, 1984). Ericsson and Simon (1993) found that concurrent verbalizations are non-reactive and do not alter participants' behavior in tasks. This technique is effective for developing an in-depth understanding of human problem-solving (Newell & Simon, 1972) and is a feasible method to trace usability problems in e-learning tools (Cotton & Gresty, 2006).

To generate first set of evidence, we asked one user of JAWS screen-reader on Windows operating system and one user of Voiceover screen-reader on MAC operating system to perform four tasks in the mini course. The tasks were, (1) interacting with the “assignment calendar,” (2) interacting with the “eText” (an electronic textbook for the myITlab course), (3) attempting the Excel1 Quiz (a simulated quiz), and (4) attempting an objective quiz. We obtain concurrent verbal protocols during these interactions. The verbalizations were audio-recorded and transcribed to produce a rich set of qualitative evidence. We decomposed the transcriptions into segments representing a single thought. We identified the segments which indicated difficulties in the context of myITlab interaction. In the evidence, here provided, the
To generate the second set of evidence, we analyzed the HTML code of the webpages corresponding to the aforementioned tasks. For this analysis we used WCAG2.0 level AA compliance requirement. World Wide Web Consortium (W3C), the parent organization of the web, under Web Accessibility Initiative (WAI) develops Web Content Accessibility Guidelines (WCAG). WCAG 2.0 is the latest version of those guidelines which forms the de-facto standard for accessibility of the web content. It defines three levels of compliance requirements, A, AA, and AAA. Pearson accessibility guidelines (Pearson, 2009) and Pearson voluntary product accessibility template version1 (Pearson, 2011) indicated their commitment towards achieving WCAG2.0 level AA compliance for their products. Therefore, we determined WCAG2.0 level AA compliance requirement to be the most realistic measure for this assessment. As this research was interested in uncovering the accessibility problems for the BVI; we further filtered he checklist to choose only those checks which were relevant for the BVI. The detail guidelines can be found in the appendix.

Guidelines and Checklist
Web Content Accessibility Guidelines 2.0 (WCAG 2.0) is a world-wide standard for incorporating web accessibility into web-applications. WCAG 2.0 comprises 12 guidelines, which are organized under four accessibility principles, namely, perceivable, operable, understandable, and robust. Each guideline is broken into testable success criterion (SC). In order to meet the needs of different groups and different situations, three levels of conformance are defined: A (lowest), AA, and AAA (highest). Each SC has an associated level of compliance, namely, A, AA, or AAA. As depicted in the table below, as a first step, we choose only level A and AA SCs in the context of this research. As a second step, we further narrow our rule set to comprise only those SCs, which are relevant to the BVI and also to the myITlab.

Assessment of the BVI Participants
The first task required the participant to navigate to the assignment calendar and to read the activities due on a particular date. The second task required the participant to attempt Excel1 Quiz using the simulated environment, the third task required the participant to interact with the eText (an electronic textbook) embedded in myITlab, and the fourth task required participants to attempt and objective quiz.

Analysis:
We consolidated the accessibility and usability issues, uncovered through both, assessment of the BVI and analysis of HTML code. The issues fall under eight groups. The following section details the outcomes of our analysis.

No or Inappropriate Text Alternatives
WCAG2.0 SC 1.1.1 requires web-developers to provide text alternatives, which convey equivalent information, for every non-text element. However, myITlab violated this requirement. For example, the audio-only flash presentations lacked text labels for buttons to control the audio. Also the audio-only presentation was not accompanied with an equivalent text transcript. There were some instances of inappropriate text alternatives for graphics. It is clearly evident from the following interaction with eText.

- SR: "last page visited button."
- BVI: "I am on Last page it seems."
- SR* down arrow.
- SR: "previous page button."
- SR* down arrow.
- SR: "next page button."
• SR* down arrow.
• SR: “graphic current page.”
• BVI: "why is this image here? Let us see."
• SR* down arrow.
• SR: "page."
• BVI: “confused, let me go further down.”
• SR* down arrow.
• SR: “two page view button.”
• BVI: "I think the image is showing the page number."

The graphic had a text alternative, however it was not an equivalent of the information presented in the graphic. This is an example of use of accessibility technique in inappropriate manner.

**Figure 1-Inappropriate Text Alternative**

**Use of Inappropriate On-Screen Text for Links**

SC2.4.4 requires purpose of each link to be determinable by its linktext alone or along with its programmatically determined context. We identified a few instances where the SC was violated. For example, the top portion of myITlab screen contains links to change the font size of the screen text. The three links have same onscreen text which is alphabet “A” only the font sizes for the link text varies. Screen-reader cannot distinguish the three links and announces them in a same way. One way to provide the appropriate text alternative for these links is to use ‘title’ attribute of the anchor HTML tag to assign meaningful text alternative.

**Use of Nested Tables for Layout Purposes**

Following is a part of JAWS’ rendering of the assignment calendar table, when JAWS was configured to read all the tables on the page. Any screen-reader, for that matter, would announce similar information to its user, so we have included output of only one screen reader. The JAWS users hear the following information when she uses down arrow key to read the assignment calendar.
Figure 2- Nested Table

- Table with 7 columns and 7 rows nesting level 4
- Sun
- Mon
- Tue
- Wed
- Thu
- Fri
- Sat
- table with 2 columns and 2 rows nesting level 5
- 1
- table end nesting level 5
- table with 2 columns and 2 rows nesting level 5
- 2
- table end nesting level 5
- table with 2 columns and 2 rows nesting level 5
- 3
- table end nesting level 5
- table with 2 columns and 2 rows nesting level 5
- 4
- table end nesting level 5
- table with 2 columns and 2 rows nesting level 5
- 5
- table end nesting level 5
- table with 2 columns and 2 rows nesting level 5
- 6
- table end nesting level 5
- table with 2 columns and 2 rows nesting level 5
- 7
Items Past Due

This demonstrates use of nested tables to create visual layout. Technically the use of tables for layout is permitted by WCAG2. However, use of nested tables overloads the user with extraneous information, which is a usability problem faced by the BVI due to inappropriate design practices. Therefore use of nested tables for layout purposes should be strictly avoided.

Unpredictable/Confusing Behavior
From the assignment calendar, the participant was able to identify the link for “Excel chapter1 eText,” After the participant hit enter on the link a next page was loaded, however it did not show the eText. Instead it provided a link to eText. The user was surprised and confused by this behavior. It is clearly evident from the following.

- SR: “link excel chapter1 eText.”
- SR* enter.
- SR: “link excel chapter1 eText.”
- BVI: “Oops, what is this? I was expecting the etext to open, here is a link again. I will press enter.”

Although, this does not violate any particular SC, it reduces the usability of myITlab.

Missing or Ambiguous Instructions
There were multiple instances of missing or ambiguous instructions, some of the instances are as follows.

1. When the link on the calendar is followed, it goes to another link to the assigned chapter.

2. When the participant clicked the link “excel chapter1 eText,” the link opened a new browser window. This was not communicated to the user anywhere in the screen text. The user found this disorienting. It is evident from the following
   - SR: new browser window http:...
   - SR* control (to silence the screen-reader)
   - BVI: “what’s this!
   - BVI: OK, it is opening in a new browser. They did not tell me this.”
(3) When the participant tried viewing eText using Mozilla Firefox browser, the eText did not open with the browser. The screen did not display any message regarding the probable causes or possible remedies. The BVI participant felt totally blocked. This violated the robust principle of WCAG2.0.

(4) Similarly, myITlab simulation was equipped with accessibility toolbar, however it was difficult for the participant to understand, how to use the intrinsic accessibility functions.

Possibility of Accidentally Skipping Questions.

It the objective test only one question displayed at a time. The participant answered the question and clicked the “next question” button. The Next question appeared, however, the focus did not move to the beginning of the page. The Screen-reader remained silent. The participant got confused and assumed that the earlier answer was not submitted. This is evident from the following.

- SR: “next question button.”
- SR* enter.
- SR: “next question button.”
- SR: silent
- SR* down arrow
- SR: “main region end.”
- BVI: “hmm, let me go up and see.”
- SR* up arrow
- Sr: “next question button.”
- BVI: “not sure whether the answer was submitted.”

The student may get confused and re-enter. This would result in a student accidentally skipping a question. Babu et al (2009) had reported a similar finding in the context of an online, objective examination using the Blackboard learning management system.
**Inconsistent User Interface**

WCAG 2.0 SC3.2.4 requires all the components serving the same functionality to be identified consistently. In the quiz interface there were two buttons for achieving the same functionality, however the labels for the two buttons were different. As shown in the screen capture below, both the buttons, one having “next” as its label, and the other having “next question” as its label, perform the same function.

![Screen Capture of Inconsistent User Interface](image)

**Figure 5 - Inconsistent User Interface**

**Inappropriate Reading Order**

WCAG 2.0 SC 1.3.2 requires the correct reading sequence of the content to be programmatically determinable, however myITlab eText interface violated the requirement. It is clearly evident from the following interaction with eText.

- SR* down arrow.
- BVI: “OK, so 386 page for AutoFill, cool.”
- SR* down arrow.
- SR: “eight.”
- BVI: "what is that?"
- SR* down arrow.
- SR* down arrow.
- SR: “Link feedback.”
- SR* down arrow.
- SR: “Go to page 397 button.”
- SR* down arrow.
- SR: “Go to page386 button.”
- BVI: “Totally lost.”

**Inadequate Operability Using Keyboard**

WCAG 2.0 SC2.1.1 requires that all the functionality of a web-application should be operable using a keyboard interface, and WCAG 2.0 SC2.1.2 mandates that, if a focus can be moved to a webpage component using a keyboard interface then focus can be shifted away from the component using only a keyboard interface; and if it needs any non-standard keyboard operations to do so, then it should be clearly communicated to the user. However, both the quiz as well as the training, which used a simulation, did not work using only a keyboard interface. This is evident in the following interaction.

- SR* down arrow
- SR: "Graphic titleBar/ titleBar clickable."
Discussion:

Pearson, on its website publishes the accessibility guidelines for digital learning products to guide its developers to develop accessible learning products (Pearson, 2009). Pearson has also published a voluntary product accessibility template (VPAT) to document accessibility of its products (Pearson, 2011). The guidelines indicate compliance to WCAG 2.0 Level AA and also to the Section 508 requirements. When compared with its competitors such as SAM, SimNet, and Snap. Pearson is certainly much ahead in terms of accessibility for the students with disabilities. Pearson has shown its commitment to providing an accessible user experience with the provision of the accessibility toolbar and speak selection tools inside myITLab, however, a totally usable and accessible myITLab experience is yet to be realized. Our brief investigation of myITLab has uncovered many critical accessibility and usability issues faced by the BVI while using myITLab. We found the following accessibility and usability issues present in myITLab, they are, (1) no or inappropriate text alternatives, (2) use of inappropriate on-screen text for links, (3) use of nested tables for layout purposes., (4) unpredictable/confusing behavior, (5) missing or ambiguous instructions, (6) inconsistent user interface, (7) inappropriate reading order, (8) inadequate keyboard operability, and (9) the possibility of accidently skipping questions.
Pearson has aptly chosen HTML5 to build myITlab, which promises huge accessibility benefits. The initial offering using this platform incorporates a mixture of accessibility features and provides a solid launch point. However, the presence of critical accessibility issues suggest a probable misalignment in the building process for accessible products. This investigation also suggests the need of involving users with disabilities in the product accessibility life cycle to ensure that, the accessibility functionality provided within the product itself is optimal.

The US government requires all organizations, which receive federal funding, to comply with Section 508 of US Rehabilitation Act, and Americans with Disabilities Act. Universities therefore, should carefully understand the accessibility pros and cons of the products they procure.

Limitations and Future Directions:
The main limitation of this study is that, due to the small number of participants, the results cannot readily generalize. However, the accessibility issues reported in this paper arise from technical pitfalls, and should have a relatively similar negative impact on all the BVI users. We appreciate the need for conducting a more expansive and rigorous accessibility review of myITlab to carry out an in-depth analysis of each feature of myITlab. In the context of UNCG, we plan to conduct a rigorous accessibility review of all the major digital user interfaces used by our students. Outcomes of this ongoing research would be useful to inform our policy for providing reasonable accommodations to the students with disabilities and the policy of digital infrastructure procurement.

Conclusion:
As the ICTs advance they create possibilities of delivering education across the planet using the internet. With the advent and proliferation of assistive technologies such as screen-reader, BVI individuals are pursuing educational opportunities in an increasing number. Although, the online education holds immense potential opportunities for the BVI, inaccessibility of online interfaces impedes the revolution. This paper investigated accessibility and usability of myITlab online environment for the BVI. Our results show that, although the product vendors are getting more and more sensitized about accessibility needs of the users with disabilities, instances of inaccessibility remain pertinent. We therefore suggest that universities carefully conduct accessibility reviews of the products.

References:
Cambridge, MA: MIT Press.

Appendix 1 – Web Content Accessibility Guidelines

<table>
<thead>
<tr>
<th>SC</th>
<th>Level of Conformance</th>
<th>Relevance to BVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1 All non-text content that is presented to the user has a text alternative that serves the equivalent purpose</td>
<td>A</td>
<td>yes</td>
</tr>
<tr>
<td>1.2.1 For prerecorded audio-only and prerecorded video-only media, text alternative is available, except when the audio or video is a media alternative for text and is clearly labeled as such:</td>
<td>A</td>
<td>yes</td>
</tr>
<tr>
<td>1.2.2 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.</td>
<td>A</td>
<td>no</td>
</tr>
<tr>
<td>1.2.3 An alternative for time-based media or audio description of the prerecorded video content is provided for synchronized media, except when the media is a media alternative for text and is clearly labeled as such.</td>
<td>A</td>
<td>yes</td>
</tr>
<tr>
<td>1.2.4 Captions are provided for all live audio content in synchronized media.</td>
<td>AA</td>
<td>no</td>
</tr>
<tr>
<td>1.2.5 Audio description is provided for all prerecorded video content in synchronized media.</td>
<td>AA</td>
<td>yes</td>
</tr>
<tr>
<td>1.2.6 Sign language interpretation is provided for all prerecorded audio content in synchronized media.</td>
<td>AAA</td>
<td>excluded</td>
</tr>
<tr>
<td>1.2.7 Where pauses in foreground audio are insufficient to allow audio descriptions to convey the sense of the video, extended audio description is provided for all prerecorded video content in synchronized media.</td>
<td>AAA</td>
<td>excluded</td>
</tr>
<tr>
<td>1.2.8</td>
<td>An alternative for time-based media is provided for all prerecorded synchronized media and for all prerecorded video-only media.</td>
<td>AAA</td>
</tr>
<tr>
<td>1.2.9</td>
<td>An alternative for time-based media that presents equivalent information for live audio-only content is provided.</td>
<td>AAA</td>
</tr>
<tr>
<td>1.3.1</td>
<td>Information, structure, and relationships conveyed through presentation can be programmatically determined or are available in text.</td>
<td>A</td>
</tr>
<tr>
<td>1.3.2</td>
<td>When the sequence in which content is presented affects its meaning, a correct reading sequence can be programmatically determined.</td>
<td>A</td>
</tr>
<tr>
<td>1.3.3</td>
<td>Instructions provided for understanding and operating content do not rely solely on sensory characteristics of components such as shape, size, visual location, orientation, or sound.</td>
<td>A</td>
</tr>
<tr>
<td>1.4.1</td>
<td>Color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.</td>
<td>A</td>
</tr>
<tr>
<td>1.4.2</td>
<td>If any audio on a Web page plays automatically for more than 3 seconds, either a mechanism is available to pause or stop the audio, or a mechanism is available to control audio volume independently from the overall system volume level.</td>
<td>A</td>
</tr>
<tr>
<td>1.4.3</td>
<td>The visual presentation of text and images of text has a contrast ratio of at least 4.5:1.</td>
<td>AA</td>
</tr>
<tr>
<td>1.4.4</td>
<td>Except for captions and images of text, text can be resized without assistive technology up to 200 percent without loss of content or functionality.</td>
<td>AA</td>
</tr>
<tr>
<td>1.4.5</td>
<td>If the technologies being used can achieve the visual presentation, text is used to convey information rather than images of text.</td>
<td>AA</td>
</tr>
<tr>
<td>1.4.6</td>
<td>The visual presentation of text and images of text has a contrast ratio of at least 7:1.</td>
<td>AAA</td>
</tr>
<tr>
<td>1.4.7</td>
<td>For prerecorded audio-only content that (1) contains primarily speech in the foreground, (2) is not an audio CAPTCHA or audio logo, and (3) is not vocalization intended to be primarily musical expression such as singing or rapping, the audio can be turned off.</td>
<td>AAA</td>
</tr>
<tr>
<td>1.4.8</td>
<td>For the visual presentation of blocks of text, a mechanism is available to resize the text.</td>
<td>AAA</td>
</tr>
<tr>
<td>1.4.9</td>
<td>Images of text are only used for pure decoration or where a particular presentation of text is essential to the information being conveyed.</td>
<td>AAA</td>
</tr>
<tr>
<td>2.1.1</td>
<td>All functionality of the content is operable through a keyboard interface without requiring specific timings for individual keystrokes, except where the underlying function requires input that depends on the path of the user's movement and not just the endpoints.</td>
<td>A</td>
</tr>
<tr>
<td>2.1.2</td>
<td>If keyboard focus can be moved to a component of the page using a keyboard interface, then focus can be moved away from that component using only a keyboard interface, and, if it requires more than unmodified arrow or tab keys or other standard exit methods, the user is advised of the method for moving focus away.</td>
<td>A</td>
</tr>
<tr>
<td>2.1.3</td>
<td>All functionality of the content is operable through a keyboard interface without requiring specific timings for individual keystrokes.</td>
<td>AAA</td>
</tr>
<tr>
<td>2.2.1</td>
<td>For each time limit that is set by the content, at least one of the following is true: Turn off: The user is allowed to turn off the time limit before encountering it; or Adjust: The user is allowed to adjust the time limit before encountering it over a wide range that is at least ten times the length of the default setting; or Extend: The user is warned before time expires and given at least 20 seconds to extend the time limit with a simple action, and the user is allowed to extend the time limit at least ten times; or 20 Hour Exception: The time limit is longer</td>
<td>A</td>
</tr>
</tbody>
</table>
than 20 hours.

2.2.2 For moving, blinking, scrolling, or auto-updating information, all of the following are true: Moving, blinking, scrolling: For any moving, blinking or scrolling information that (1) starts automatically, (2) lasts more than five seconds, and (3) is presented in parallel with other content, there is a mechanism for the user to pause, stop, or hide it unless the movement, blinking, or scrolling is part of an activity where it is essential; and, Auto-updating: For any auto-updating information that (1) starts automatically and (2) is presented in parallel with other content, there is a mechanism for the user to pause, stop, or hide it or to control the frequency of the update unless the auto-updating is part of an activity where it is essential.

<table>
<thead>
<tr>
<th>2.2.3 Timing is not an essential part of the event or activity presented by the content, except for non-interactive synchronized media and real-time events.</th>
<th>AAA excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.4 Interruptions can be postponed or suppressed by the user, except interruptions involving an emergency.</td>
<td>AAA excluded</td>
</tr>
<tr>
<td>2.2.5 When an authenticated session expires, the user can continue the activity without loss of data after re-authenticating.</td>
<td>AAA excluded</td>
</tr>
<tr>
<td>2.3.1 Web pages do not contain anything that flashes more than three times in any one second period, or the flash is below the general flash and red flash thresholds.</td>
<td>A no</td>
</tr>
<tr>
<td>2.3.2 Three Web pages do not contain anything that flashes more than three times in any one second period.</td>
<td>AAA excluded</td>
</tr>
<tr>
<td>2.4.1 A mechanism is available to bypass blocks of content that are repeated on multiple Web pages.</td>
<td>A yes</td>
</tr>
<tr>
<td>2.4.2 Web pages have titles that describe topic or purpose.</td>
<td>A yes</td>
</tr>
<tr>
<td>2.4.3 If a Web page can be navigated sequentially and the navigation sequences affect meaning or operation, focusable components receive focus in an order that preserves meaning and operability.</td>
<td>A yes</td>
</tr>
<tr>
<td>2.4.4 The purpose of each link can be determined from the link text alone or from the link text together with its programmatically determined link context, except where the purpose of the link would be ambiguous to users in general.</td>
<td>A yes</td>
</tr>
<tr>
<td>2.4.5 More than one way is available to locate a Web page within a set of Web pages except where the Web Page is the result of, or a step in, a process.</td>
<td>AA yes</td>
</tr>
<tr>
<td>2.4.6 Headings and labels describe topic or purpose.</td>
<td>AA yes</td>
</tr>
<tr>
<td>2.4.7 Any keyboard operable user interface has a mode of operation where the keyboard focus indicator is visible.</td>
<td>AA yes</td>
</tr>
<tr>
<td>2.4.8 Information about the user's location within a set of Web pages is available.</td>
<td>AAA excluded</td>
</tr>
<tr>
<td>2.4.9 A mechanism is available to allow the purpose of each link to be identified from link text alone, except where the purpose of the link would be ambiguous to users in general.</td>
<td>AAA excluded</td>
</tr>
<tr>
<td>2.4.10 Section headings are used to organize the content.</td>
<td>AAA excluded</td>
</tr>
<tr>
<td>3.1.1 The default human language of each Web page can be programmatically determined.</td>
<td>A yes</td>
</tr>
<tr>
<td>3.1.2 The human language of each passage or phrase in the content can be programmatically determined except for proper names, technical terms, words of indeterminate language, and words or phrases that have become part of the vernacular of the immediately surrounding text.</td>
<td>AA yes</td>
</tr>
<tr>
<td>3.1.3 A mechanism is available for identifying specific definitions words or phrases used in an unusual or restricted way, including idioms and jargon.</td>
<td>AAA excluded</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>3.1.4</td>
<td>A mechanism for identifying the expanded form or meaning of abbreviations is available.</td>
</tr>
<tr>
<td>3.1.5</td>
<td>When text requires reading ability more advanced than the lower secondary education level after removal of proper names and titles, supplemental content, or a version that does not require reading ability more advanced than the lower secondary education level, is available.</td>
</tr>
<tr>
<td>3.1.6</td>
<td>A mechanism is available for identifying specific pronunciation of words where meaning of the words, in context, is ambiguous without knowing the pronunciation.</td>
</tr>
<tr>
<td>3.2.1</td>
<td>When any component receives focus, it does not initiate a change of context.</td>
</tr>
<tr>
<td>3.2.2</td>
<td>Changing the setting of any user interface component does not automatically cause a change of context unless the user has been advised of the behavior before using the component.</td>
</tr>
<tr>
<td>3.2.3</td>
<td>Navigational mechanisms that are repeated on multiple Web pages within a set of Web pages occur in the same relative order each time they are repeated, unless a change is initiated by the user.</td>
</tr>
<tr>
<td>3.2.4</td>
<td>Components that have the same functionality within a set of Web pages are identified consistently.</td>
</tr>
<tr>
<td>3.2.5</td>
<td>Changes of context are initiated only by user request or a mechanism is available to turn off such changes.</td>
</tr>
<tr>
<td>3.3.1</td>
<td>If an input error is automatically detected, the item that is in error is identified and the error is described to the user in text.</td>
</tr>
<tr>
<td>3.3.2</td>
<td>Labels or instructions are provided when content requires user input.</td>
</tr>
<tr>
<td>3.3.3</td>
<td>If an input error is automatically detected and suggestions for correction are known, then the suggestions are provided to the user, unless it would jeopardize the security or purpose of the content.</td>
</tr>
<tr>
<td>3.3.4</td>
<td>For Web pages that cause legal commitments or financial transactions for the user to occur, that modify or delete user-controllable data in data storage systems, or that submit user test responses, at least one of the following is true: 1. Reversible: Submissions are reversible. 2. Checked: Data entered by the user is checked for input errors and the user is provided an opportunity to correct them. 3. Confirmed: A mechanism is available for reviewing, confirming, and correcting information before finalizing the submission.</td>
</tr>
<tr>
<td>3.3.5</td>
<td>Context-sensitive help is available.</td>
</tr>
<tr>
<td>3.3.6</td>
<td>For Web pages that require the user to submit information, errors can be prevented.</td>
</tr>
<tr>
<td>4.1.1</td>
<td>In content implemented using markup languages, elements have complete start and end tags, elements are nested according to their specifications, elements do not contain duplicate attributes, and any IDs are unique, except where the specifications allow these features.</td>
</tr>
<tr>
<td>4.1.2</td>
<td>For all user interface components (including but not limited to: form elements, links and components generated by scripts), the name and role can be programatically determined; states, properties, and values that can be set by the user can be programatically set; and notification of changes to these items is available to user agents, including assistive technologies.</td>
</tr>
</tbody>
</table>

*Table 1 - Web Content Accessibility Guidelines 2.0*