THE ACCESSIBILITY OF SOUTH EAST ASIAN TECHNICAL UNIVERSITIES WEBSITES

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ABSTRACT

Web accessibility is one of the essential issues in the information age. This paper aims to highlight the importance of web accessibility and raise awareness on this issue in higher education institutes and universities. The websites of nine South East Asian technical universities were evaluated. These include the websites of Shibaura Institute of Technology, University Technology Malaysia, Gadjah Mada University, Bandung Institute of Technology, Hanoi University of Science and Technology, Ho Chi Minh City University of Technology, Thai Nichi Institute of Technology, King Mongkut's University of Technology Thonburi, and Suranaree University of Technology. AChecker, the automated web accessibility checking tool, was used to test conformance to Web Accessibility Guidelines (WCAG) 2.0 provided by the World Wide Web Consortium (W3C). The results show the conformance levels of each website, numbers of problems/errors and types of unsuccessful guidelines. In light of this study's findings, some recommendations that web designers can implement to improve web accessibility levels are provided.

1. INTRODUCTION

The importance of the web as a resource in daily life is continuously increasing. People access the web for many purposes such as recreation, communication, e-commerce and, especially, education. To provide equal access and equal opportunity to persons/people with any impairment (e.g., low vision, blindness, hard of hearing, deafness, physical disabilities and cognitive disabilities) and older people, the web should be accessible to everyone. Thus, web accessibility is an important principle in the information age (Al-Khalifa, 2012; Kamollimsakul, Petrie, and Power, 2014).

Web accessibility refers to the level to which each website is accessible to people with any kind of disabilities, including older people. The World Wide Web Consortium (W3C), an organisation for the standardisation of the web, has proposed a set of guidelines called Web Content Accessibility Guidelines 1.0 (WCAG 1.0) on May, 1999 and the current guidelines called WCAG 2.0 on December, 2008 (Caldwell, Cooper, Guarino Reid, and Vanderheiden, 2008).

The WCAG 2.0 consists of four main principles with twelve guidelines, which are as follows:

1. Perceivable

Guideline 1.1 Text Alternatives: Provide text alternatives for any non-text content

Guideline 1.2 Time-based Media: Provide alternatives for time-based media

Guideline 1.3 Adaptable: Create content that can be presented in different ways without losing information or structure.

Guideline 1.4 Distinguishable: Make it easier for users to see and hear content including separating foreground from background.

2. Operable

Guideline 2.1 Keyboard Accessible: Make all functionality available from a keyboard.

Guideline 2.2 Enough Time: Provide users enough time to read and use content

Guideline 2.3 Seizures: Do not design content in a way that is known to cause seizures

Guideline 2.4 Navigable: Provide ways to help users navigate, find content, and determine where they are.

3. Understandable

Guideline 3.1 Readable: Make text content readable and understandable.

Guideline 3.2 Predictable: Make Web pages appear and operate in predictable ways

Guideline 3.3 Input Assistance: Help users avoid and correct mistakes.

4. Robust

Guideline 4.1 Compatible: Maximize compatibility with current and future user agents.

In these four main principles with twelve guidelines comprise a series of 61 Success Criteria (SC).

The levels of conformance to WCAG 2.0 are divided into the minimum level of conformance (Level A), the intermediate level of conformance (Level AA), and the high level of conformance (Level AAA). To achieve Level AAA, the webpage should meet all the Level A, Level AA, and Level AAA Success Criteria.

2. METHODS

Each English-version homepage of the nine Southeast Asian technical universities was evaluated. There were the homepages of Shibaura Institute of Technology (SIT), University Technology Malaysia (UTM), Gadjah Mada University (UGM), Bandung Institute of Technology (ITB), Hanoi University of Science and Technology (HUST), Ho Chi Minh City University of Technology (HCMUT), Thai Nichi Institute of Technology (TNIT), King Mongkut's University of Technology (KMUTT), and Suranaree University of Technology (SUT) (see Table 1).

Table 1. Homepage of each university in this study.

University	Homepage
SIT	http://www.shibaura-it.ac.jp/en/
UTM	http://www.utm.my/
UGM	http://www.ugm.ac.id/en/
ITB	http://www.itb.ac.id/en/
HUST	http://en.hust.edu.vn/home
HCMUT	http://www.hcmut.edu.vn/en/
TNIT	http://www.tni.ac.th/web/en/
KMUTT	http://global.kmutt.ac.th/
SUT	http://web.sut.ac.th/2012/en/

AChecker (http://achecker.ca), the automated web accessibility-checking tool, was used to test the conformance of the webpage to WCAG 2.0 level AA.

3. RESULTS

The results show that no homepage of the Southeast Asian technical universities conforms to WCAG 2.0 Level AA (see Table 2). ITB, SIT, and UGM had lower numbers of errors than the other universities at only 1, 3, and 8 errors, respectively, while KMUTT, INIT, and SUT had significantly more numbers of errors at 52, 50, and 47 errors, respectively.

The unsuccessful guidelines of SIT homepage were Guideline 1.3 (check 57 and 213), and Guideline 3.3 (check 188). The unsuccessful guidelines of UTM homepage were Guideline 1.1 (check 7), Guideline 1.4 (check 301), Guideline 2.1 (check 106 and 107), Guideline 2.4 (check 37-39 and 174) and Guideline 4.1 (check 185). The unsuccessful guidelines of UGM homepage were Guideline 1.1 (check 1), Guideline 2.4 (check 174) and Guideline 4.1 (check 185). The unsuccessful guideline of ITB homepage was only Guideline 2.4 (check 37). The HUST homepage was unsuccessful on Guideline 1.1 (check 58 and 163), Guideline 1.3 (check 57 and 213), Guideline 3.1 (check 48-49) and Guideline 3.3 (check 188). The HCMUT homepage was unsuccessful on Guideline 1.1 (check 1 and 163) and Guideline 3.1 (check 48-49). The TNIT homepage was unsuccessful on Guideline 1.1 (check 1 and 7), Guideline 2.4 (check 37), Guideline 3.1 (check 48-49) and Guideline 4.1 (check 185). The KMUTT homepage was unsuccessful on Guideline 1.4 (check

Table 2. Number of errors for each guideline for each university's homepage.

University name	Number of errors for each guideline												Overall errors per University
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	
SIT	-	-	2	-	-	-	-	-	-	-	1	-	3
UTM	1	-	-	2	24	-	-	6	-	-	-	1	34
UGM	6	-	-	-	-	-	-	1	-	-	-	1	8
ITB	-	-	-	-	-	-	-	1	-	-	-	-	1
HUST	6	-	3	-	-	-	-	1	2	-	2	1	15
HCMUT	16	-	-	-	-	-	-	-	2	-	-	-	18
TNIT	46	-	-	-	-	-	-	1	2	-	-	1	50
KMUTT	-	-	-	45	-	-	-	6	-	-	1	-	52
SUT	7	-	15	-	16	-	-	-	2	-	7	-	47
Overall errors	82	-	20	47	40	-	-	16	8	-	11	4	228

301-302 and 304), Guideline 2.4 (check 40 and 174) and Guideline 3.3 (check 188). The SUT homepage was unsuccessful on Guideline 1.1 (check 1), Guideline 1.3 (check 57, 118, 121, 168, 206-207 and 213), Guideline 2.1 (check 106-107), Guideline 3.1 (check 48-49) and Guideline 3.3 (check 188).

Table 2 also shows that the most commonly unsuccessful guidelines were Guideline 1.1 and Guideline 2.4. Six universities' homepages failed to conform to these guidelines, while four could not conform to Guideline 3.1, Guideline 3.3 and Guideline 4.1. However, all nine universities' homepages succeeded on Guideline 1.2,

Table 3. Guidelines, Success Criteria and checkpoints to which the homepages did not conform and the solutions.

Guidelines, Success Criteria, and Check points	Solutions
Guideline 1.1 Text Alternatives: Provide text alternatives for any non-text content *Success Criteria 1.1.1 Non-text Content (A)*	
Check 1: image element missing alt attribute.	Add an alt attribute to your image element.
Check 7: Image used as anchor is missing valid Alt text.	Add an alt text that identifies the purpose or function of the image.
Check 58: Image used for input element is missing Alt text.	Add an alt attribute that describes the image to input element.
Check 163: embed element missing noembed element.	Add a noembed element within or beside the embed element. Add text to the noembed element that is equivalent to the embed element.
Guideline 1.3 Adaptable: Create content that can be presented in different ways without losing information or structure. *Success Criteria 1.3.1 Info and Relationships (A)*	
Check 57: input element, type of "text", missing an associated label.	Add a label element that surrounds the control's label. Set the for attribute on the label element to the same value as the id attribute of the control. And/or add a title attribute to the input element. And/or create a label element that contains the input element.
Check 118: input element, type of "password", missing an associated label.	
Check 121: input element, type of "radio", missing an associated label.	
Check 168: Form missing fieldset and legend to group multiple radio buttons.	Add a fieldset and legend element to the form for each group of radio buttons.
Check 204: input element, type of "radio", has no text in label.	Add text to the input element's associated label that describes the purpose or function of the control.
Check 207: input element, type of "password", has no text in label.	
Check 213: input element, type of "text", has no text in label.	
Guideline 1.4 Distinguishable: Make it easier for users to see and hear content including separating foreground from background. *Success Criteria 1.4.3 Contrast (Minimum) (AA)*	
Check 301: The contrast between the colour of text and its background for the element is not sufficient to meet WCAG2.0 Level AA.	Use a colour contrast evaluator to determine if text and background colours provide a contrast ratio of 4.5:1 for standard text, or 3:1 for larger text. Change colour codes to produce sufficient contrast. http://www.w3.org/TR/UNDERSTANDING-WCAG20/visual-audio-contrast-contrast.html#visual-audio-contrast-contrast-resources-head
Check 302: The contrast between the colour of visited link text and its background for the element is not sufficient to meet WCAG2.0 Level AA.	
Check 304: The contrast between the colour of selected link text and its background is not sufficient to meet WCAG2.0 Level AA.	
Guideline 2.1 Keyboard Accessible: Make all functionality available from a keyboard. *Success Criteria 2.1.1 Keyboard (A)*	
Check 106: script not keyboard accessible - onmouseout missing onblur.	Add an onblur handler to your script that performs the same function as the onmouseout handler.
Check 107: onmouseover event handler missing onfocus event handler.	Add an onfocus handler to your script that performs the same function as the onmouseover handler.
Guideline 2.4 Navigable: Provide ways to help users navigate, find content, and determine where they are. *Success Criteria 2.4.2 Page Titled (A)*	
Check 50: Document missing title element.	Repair: Add a title element to the head section of the document.

Table 3. Guidelines, Success Criteria and checkpoints to which the homepages did not conform and the solutions. (continue)

Guidelines, Success Criteria, and Check points	Solutions
Success Criteria 2.4.4 Link Purpose (In Context) (A)	
Check 174: Anchor contains no text.	Add text to the a element or the title attribute of the a element or, if an image is used within the anchor, add Alt text to the image.
Success Criteria 2.4.6 Headings and Labels (AA)	
Check 37: Header nesting - header following h1 is incorrect.	Modify the header levels so only an h1 or h2 follows h1.
Check 38: Header nesting - header following h2 is incorrect.	Modify the header levels so only an h3 or any header less than h3 follows h2.
Check 39: Header nesting - header following h3 is incorrect.	Modify the header levels so the header following an h3 is h1, h2, h3 or h4.
Check 40: Header nesting - header following h4 is incorrect.	Modify the header levels so the header following an h4 is h1, h2, h3, h4 or h5.
Guideline 3.1 Readable: Make text content readable and understandable. *Success Criteria 3.1.1 Language of Page (A)*	
Check 48: Document language not identified.	For HTML documents add the lang attribute and a valid ISO-639-1 two letter language code to the opening HTML element. For XHTML documents add both the lang and xmllang attributes with a valid ISO-639-1 two letter language code to the opening HTML element.
Check 49: Document has invalid language code.	Add a valid 2 letter or 3 letter language code as defined in the ISO 639 specification to the HTML 'lang' attribute. For XHTML, both 'lang' and 'xml:lang' must be set.
Guideline 3.3 Input Assistance: Help users avoid and correct mistakes. *Success Criteria 3.3.2 Labels or Instructions (A)*	
Check 188: Label text is empty.	Add text to the label element.
Guideline 4.1 Compatible: Maximize compatibility with current and future user agents. *Success Criteria 4.1.1 Parsing (A)*	
Check 185: id attribute is not unique.	Modify the id attribute value so it is unique.

Guideline 2.2, Guideline 2.3 and Guideline 3.2. Table 3 shows the guidelines, success criteria and checkpoints to which the homepages did not conform and the solutions.

3. DICUSSION AND CONCLUSIONS

This study found that no homepage of the examined South East Asian technical universities passed the WCAG 2.0 Level AA conformance test. The ITB and SIT homepages were nearly successful in the test. The homepages of universities in Malaysia and Japan, with the exception of UTM, had small numbers of errors. The homepages of two universities in Vietnam had average numbers of errors, but the homepages of all three universities in Thailand had high numbers of errors. This result might reflect the web accessibility situation in each country.

The most frequently unsuccessful guidelines were Guideline 1.1, text alternatives, and Guideline 2.4, navigability. When text alternatives are not provided, visually impaired persons cannot understand the non-text content. In addition, well-organised page with navigation cues such as title and header helps users navigate and find information on the web. However, this study is a preliminary study and only the homepages of the universities'websites were tested. Further research should examine the complete websites. Other types of webpages beside educational websites should be studied.

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