

Accessibility Evaluation of University Websites in Indonesia based on WCAG 2.2 Guidelines

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Abstract

Universities use websites as their main portal and main source of information. However, some university websites in Indonesia still show accessibility issues and do not meet the Web Content Accessibility Guidelines (WCAG) 2.2 standards. This research aims to evaluate the accessibility of five university websites in Indonesia based on the Similarweb platform. The evaluation focused on color blindness, attention deficit, and limited movement. These three disabilities are considered to have a significant impact on web accessibility. The method used in this study was WCAG-EM by using a combination of automated and manual evaluation. The automated evaluation used WAVE and Siteimprove Accessibility Checker tools. Meanwhile, manual evaluation adopted the evaluation steps from the Accessibility Insights tool by Microsoft. The results of the automated evaluation showed that the accumulated issues obtained from all university homepages were 188 issues. There are 7 types of issues identified through manual evaluation. The most common accessibility issue found is components with low contrast between the foreground and background. These results indicate that university websites in Indonesia, based on Similarweb rankings, still do not meet the international standards WCAG.

Keyword: accessibility, WCAG, website, university

1 Introduction

Accessibility is important for ensuring that digital technology is usable by people with disabilities [1]. In this context, accessibility is not only important in physical contexts but also in the digital world (websites, applications, and other digital platforms).

Universities now rely on websites as the primary source of information for everyone, including people with disabilities [2]. The goal of web accessibility is to provide equal opportunities for all people to access the functions and information resources on a website by removing barriers that limit a person's access [3], [4]. However, in practice, many university websites in Indonesia still do not meet accessibility standards. This is evidenced by [5], who showed that 23.9% of university websites fall into the inaccessible category. In addition, several studies, such as [2], [6], [7], showed that university websites still have a significant number of accessibility issues.

Accessibility evaluations were conducted on five university websites in Indonesia, selected based on their top five rankings on the Similarweb platform. Similarweb is a platform that ranks websites based on how frequently they are accessed. Frequently accessed websites have greater exposure and are more likely to be used by more people, making accessibility evaluations more meaningful and impactful for many people. Besides, the chance for the website to be accessed by the disabled is higher. Accessibility evaluations of websites selected from Similarweb rankings were done by [7].

Based on data from Similarweb accessed on April 10, 2025, the five most frequently accessed university websites in Indonesia are Gadjah Mada University, University of Indonesia, Binus University, Airlangga University, and Padjajaran University [8]. These five universities were chosen due to limited access. Moreover, the data was collected from January 2025 to March 2025 because of the limited access to the Similarweb platform. Figure 1 shows the ranking of universities in Indonesia on the Similarweb platform from January to March 2025.

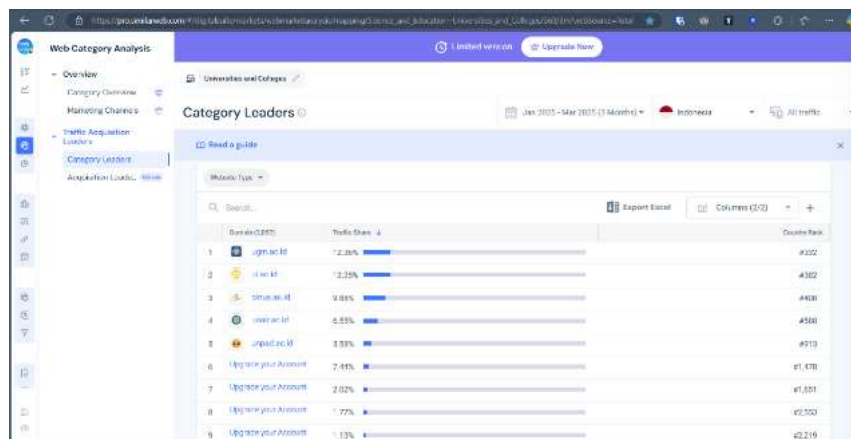


Figure 1 University rankings in indonesia on similarweb

There is a previous study by [9] that discusses the accessibility evaluation of non-structural institution websites in Indonesia based on WCAG 2.2 using SilkTide Accessibility Checker. Research by [2] discusses the accessibility analysis of university websites in Indonesia based on Webometric rankings. Using WCAG 2.0 guidelines and the WAVE & AChecker tools. A study by [10] evaluated the accessibility of four university websites for visually impaired users based on WCAG 2.0. This study included a manual evaluation focusing on accessibility, zoom behavior, navigation, and contrast. A study by [11] examined web accessibility in higher education in Norway using WCAG 2.1. This study used a combination of automated tools and manual evaluation. No research has focused on university websites in Indonesia based on Similarweb rankings. Previous studies evaluating university website accessibility have only used automated detection tools and have not yet referred to WCAG 2.2.

Web Content Accessibility Guidelines (WCAG) are international guidelines to ensure the accessibility of web content for all users, including those with disabilities [12]. This study used WCAG 2.2 because the current WCAG standard is WCAG 2.2 (AA), and it is compatible with previous versions. This study focused on success criteria levels A and AA because the recommended standards extend up to level AA, while level AAA is considered too stringent and impossible to fully meet [13], [14]. This study only evaluated the homepage of each website as a representative sample. This is very common, many researchers do the same when evaluating web accessibility [11]. The homepage is considered representative of all pages [11]. Furthermore, the homepage is the first point of contact before exploring other pages. Inaccessible homepage can cause difficulties for users when trying to access other pages [11], [15]. An accessibility evaluation focusing on the homepage was also conducted by [2], [3], [7], [10], [11], [15]–[18].

The method used in this study is the Website Accessibility Conformance Evaluation Methodology (WCAG-EM), which provides a standardized and systematic approach to assessing a website's compliance with WCAG standards [16], [19]. The results of this study include accessibility evaluation results and recommendations for improvement.

This study used a combination of automated and manual evaluations. According to [20], automated evaluation tools can only measure less than 40% of accessibility errors on a website. Similarly, according to [21], [22], automated evaluation tools cannot detect all accessibility issues, especially those that are contextual or require human understanding, such as checking website focus order, non-text contrast, and target size. According to Verkijika in [11] manual evaluation is the most accurate and reliable way to identify accessibility issues on a website. The tools used for automated evaluation were WAVE and Siteimprove Accessibility Checker. A combination of tools is used because there is no single automated tool that is ideal for all aspects of accessibility [23]. Besides, WAVE and Siteimprove already support WCAG 2.2, open source, easy to use, and the combination of the two covers most of the WCAG 2.2 success criteria. For manual evaluation, the Accessibility Insights tool was used because its manual evaluation covers all WCAG 2.2 level A and AA success criteria [24].

This study tries to answer research questions: (1) What are the result of the accessibility evaluation of five university websites in Indonesia based on Similarweb, referring to the WCAG 2.2

guidelines? (2) What are the recommendations for improvement based on the results of the accessibility evaluation referring to the WCAG 2.2 guidelines? This research is expected to become a reference for universities to provide an inclusive access on their website, especially for those with disability. This research contributes to helping universities better comply with the international standards, Web Content Accessibility Guidelines (WCAG).

2 Literature Review

Several previous studies have evaluated website accessibility using WCAG. A study by [10] evaluated four university websites in Romania for users with visual impairments. The evaluation adhered to WCAG 2.0 (AA). The evaluation was conducted using a combination of automated evaluation using Total Validator and manual evaluation using a screen reader. The manual evaluation in this study was limited to four criteria, accessibility tool availability, zoom behavior, navigation, and contrast.

A study by [11] evaluated the accessibility of university website homepages in Norway. The evaluation adhered to WCAG 2.1 (AA) using a combination of automated evaluation using WAVE and manual evaluation using a screen reader.

[18] conducted accessibility evaluations at 11 universities in Colombia using WCAG 2.1 (AAA) guidelines and correlated them with the U-Sapiens 2020-1 ranking. The evaluation focused on the website homepages using a combination of automated evaluation using TAW and WAVE, and manual evaluation using the JAWS screen reader.

Research by [17] evaluated the accessibility of Bangladesh government websites using the WCAG 2.0 (AA) standard. This study used a combination of automated and manual evaluations. The automated evaluation used a combination of tools, including Total Validator, CynthiaSays, TAW, Readability by Webfx.com, Readability by Readable.com, AChecker, WAVE, Color Contrast Analyzer, HTML5, and ARIA. The manual test was conducted using Keyboard Accessibility.

Research by [9] evaluated the accessibility of 60 websites of Indonesian non-structural institutions and related them to corporate digital responsibility for the government. This study referred to the WCAG 2.2 (AAA) standard. The evaluation was conducted using the Silktide Accessibility Checker tool.

From the review of previous research, it was found that there are still a few studies that used WCAG 2.2 guidelines. Most previous studies still use automated tools only in evaluating accessibility. In addition, most studies determined the level of accessibility based on the number of errors detected by the tools without further evaluation and checking of the errors detected. This condition shows the importance of involving manual evaluation by humans. The previous research did not manually verify the results of the automated evaluation. Therefore, research is needed that evaluates manually every success criterion that cannot be measured by automated tools or requires human understanding, as well as rechecking every error detected by the tools, adjusting it to the WCAG 2.2 guidelines. There is no research that focuses on color blindness users/color vision deficiency, attention deficit, and limited movement. These three types of disability become crucial because it is directly impacted if the website is not accessible. Previous research shows the importance of web accessibility on university websites as a main portal/source of information.

3 Research Method

This research uses the WCAG-EM (Website Accessibility Conformance Evaluation Methodology) with five main stages such as Define the Evaluation Scope, Explore the Targeted Website, Select the Representative Sample, Evaluate the Selected Sample, and Report the Evaluation Findings [25]. Figure 2 below illustrates the conceptual framework of this research.

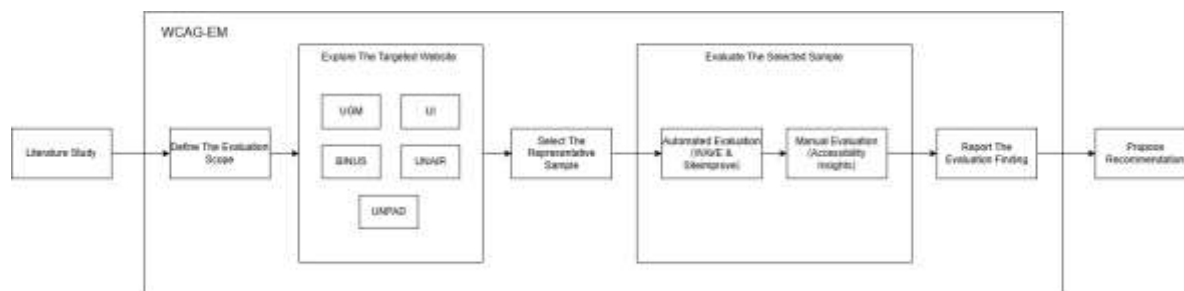


Figure 2 Conceptual framework

Literature Study phase will be conducted on various sources taken from previous research, documents, and websites regarding accessibility evaluation using WCAG, which are relevant to this research. Define the Evaluation Scope stage, where researchers determine the websites to be evaluated, the disability focus, the guidelines used, the success criteria used, the evaluation tools, and the data collection process. The assessment focused on the websites of universities in Indonesia that were ranked among the top five most frequently accessed websites according to Similarweb. Data was collected from January 2025 to March 2025, they are Gadjah Mada University, University of Indonesia, Binus University, Airlangga University, and Padjajaran University. The focus of disabilities in this study was color blindness/color vision deficiency, attention deficit, and limited movement. These three disabilities were chosen because they are considered have a significant impact on website accessibility. People with color blindness or color vision disorders have difficulty distinguishing colors. A low contrast website design will certainly hinder users with color blindness or color vision disorders. Users with attention disorders may have difficulty understanding the content on the website. Therefore, it is important to provide a website that is easy to understand and free from distractions. Users with limited mobility may have difficulty operating the website, so the website must be operable using an active keyboard. The evaluation refers to the WCAG 2.2 guidelines with compliance levels A and AA. The success criteria used were those related to the three disabilities that became the focus of the study. Explore The Targeted stage is the exploration phase of the target website. Understand the complexity and functionality of each page to determine a representative sample to be used in the evaluation process. Select the Representative Sample stage, where the evaluation will only focus on the homepage, because it is the most complex, newest, and the starting point for visitors. This page can be representative of other pages. Evaluate the Selected Sample stage, where the evaluation is conducted on a selected sample using either automated or manual evaluation tools. Report the Evaluation Finding stage, where all accessibility issues found are documented and summarized in a table. The proposed Recommendation stage provides improvement recommendations for each type of issue identified.

4 Results and Analysis

After the evaluation, several accessibility issues were found on each homepage. The homepage of the Gadjah Mada University website was tested using WAVE and Siteimprove Accessibility Checker on October 4, 2025. Based on the three disabilities that become the focus of this research, there are several accessibility issues detected by WAVE and Siteimprove. The total errors detected by both tools are 52. WAVE detected 1 broken skip link, 1 broken ARIA menu, 50 very low contrast, and there were no accessibility issues related to these disability detected by Siteimprove. Table 1 shows the details of the measurement results obtained.

Table 1 Automated evaluation results for the gadjah mada university's homepage

Errors	Total	Success Criteria	Source
Broken skip link	1	2.1.1 Keyboard 2.4.1 Bypass Blocks	WAVE
Broken ARIA menu	1	2.1.1 Keyboard	WAVE
Very low contrast	50	1.4.3 Contrast (Minimum)	WAVE

The University of Indonesia website was tested using WAVE and Siteimprove Accessibility Checker on October 4, 2025. The total errors detected by both tools are 21. WAVE detected 21 contrast errors, and Siteimprove detected 14 contrast errors. All contrast errors detected by Siteimprove had been detected by WAVE. Table 2 shows the details of the results of measuring the University of Indonesia homepage using the automated tools.

Table 2 Automated evaluation results for the university of indonesia’s homepage

Errors	Total	Success Criteria	Source
Very low contrast	21	1.4.3 Contrast	WAVE
	14	(Minimum)	Siteimprove

The Binus University website was tested using the WAVE and Siteimprove Accessibility Checker on October 4, 2025. The total errors detected by both tools are 67. WAVE detected 47 contrast errors, and Siteimprove detected 43 contrast errors. Some errors in WAVE were not detected by Siteimprove, and vice versa, and some errors were detected by both. Table 3 shows the details of the accessibility measurement results on the Binus University homepage using the automated tools.

Table 3 Automated evaluation results for the binus university’s homepage

Errors	Total	Success Criteria	Source
Very low contrast	47	1.4.3 Contrast	WAVE
	43	(Minimum)	Siteimprove

The Airlangga University website was tested using the WAVE and Siteimprove Accessibility Checker on September 22, 2025. The total errors detected by both tools are 37. WAVE detected 28 contrast errors, and Siteimprove detected 4 contrast errors. Contrast errors detected by Siteimprove had been detected by WAVE. The total contrast errors detected by both tools are 28. Siteimprove also detected 9 components with sizes that did not meet the minimum standard of 24 by 24 pixels. Table 4 shows the detailed results of the Airlangga University homepage measurements using the automated tools.

Table 4 Automated evaluation results for the airlangga university’s homepage

Errors	Total	Success Criteria	Source
Interactive element does not meet minimum size nor spacing	9	2.5.8 Target Size	Siteimprove
		(Minimum)	
Low contrast	28	1.4.3 Contrast	WAVE
	4	(Minimum)	Siteimprove

The evaluation of Padjajaran University's website using the WAVE and Siteimprove Accessibility Checker was conducted on September 22, 2025. The total errors detected are 11. WAVE detected 8 contrast errors, and Siteimprove detected 6 contrast errors. All contrast errors detected by Siteimprove were detected by WAVE. Siteimprove also detected 3 errors related to interactive components with sizes that did not meet the minimum standards. Table 5 shows the detailed results of the Padjajaran University homepage measurement using the automated tools.

Table 5 Automated evaluation results for the Padjajaran University’s homepage

Errors	Total	Success Criteria	Source
Interactive element does not meet minimum size nor spacing	3	2.5.8 Target Size	Siteimprove
		(Minimum)	
Low contrast	8	1.4.3 Contrast	WAVE
	6	(Minimum)	Siteimprove

The following is a summary of all accessibility issues identified through automated evaluation. Table 6 shows four types of accessibility issues identified by the automated evaluation tool. The total errors detected from all university homepages are 188. The Binus University homepage had the most accessibility issues identified by automated evaluation, with 67 errors. This was followed by Gadjah

Mada University with 52 errors, Airlangga University with 37 errors, the University of Indonesia with 21 errors, and Padjajaran University with 11 errors.

Table 6 All errors from automated evaluation

Errors	UGM	UI	BINUS	UNAIR	UNPAD
Broken skip link	1	-	-	-	-
Broken ARIA menu	1	-	-	-	-
Very low contrast	50	21	67	28	8
Interactive element does not meet minimum size nor spacing	-	-	-	9	3
Total	52	21	67	37	11

A broken skip link is a condition where a “Skip to Content” link exists, but the target does not exist or the link cannot be accessed with a keyboard. Based on the WCAG 2.2 success criteria, this issue does not comply with success criteria 2.1.1 Keyboard (A) and 2.4.1 Bypass Blocks (A). Figure 3 below is an example of a broken skip link error found on the Gadjah Mada University website.



Figure 3 Broken skip link errors found on gadjah mada university’s homepage

A broken ARIA menu occurs when the ARIA attributes used do not match the correct menu structure. The broken ARIA menu occurs because the ARIA standard requires that an element with role="menu" contain at least one element with role="menuitem," role="menuitemcheckbox," or role="menuitemradio." This issue does not comply with success criterion 2.1.1 Keyboard (A). Figure 4 below is a broken ARIA menu error found on the Gadjah Mada University website.

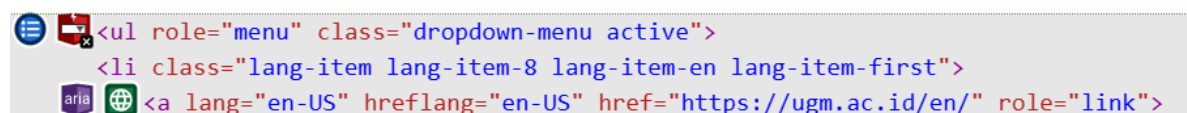


Figure 4 Broken ARIA menu on gadjah mada university’s homepage

Very low contrast occurs when the foreground and background of a text component do not have sufficient contrast. Figure 5 is one of the contrast errors found on the Gadjah Mada University website. The contrast ratio between the text color and its background is 3.54:1. This does not comply with success criterion 1.4.3 Contrast (Minimum).



Figure 5 Very low contrast component on gadjah mada university’s homepage

The interactive element does not meet the minimum size nor spacing is a violation of success criteria 2.5.8 Target Size (Minimum), as it does not meet the minimum size of 24 by 24 pixels. The following is one component detected with a target size issue. Figure 6 is one of the related errors detected on the Airlangga University website using the Siteimprove Accessibility Checker tool.



Figure 6 Component with target size less than 24 x 24 pixels

After automatic evaluation, manual evaluation is performed. Through manual evaluation using the Accessibility Insights tool, several issues were identified that were not detected by the automated evaluation tools WAVE and Siteimprove Accessibility Checker.

Table 7 below shows the results of a manual evaluation of the Gadjah Mada University homepage. The evaluation was conducted on October 4, 2025. Several accessibility issues were identified, including 50 text does not have enough color contrast, 9 components cannot be accessed using the keyboard, 1 non functioning bypass block, 16 components do not have a logical order when receiving keyboard focus, and 142 missing visible indication of keyboard focus for all active components.

Table 7 Manual evaluation result of gadjah mada university's homepage

Errors	Total	Success Criteria
The text does not have enough color contrast	50	1.4.3 Contrast (Minimum)
Unable to navigate/select some menus using keyboard	9	2.1.1 Keyboard
There is bypass blocks, but it is not functioning	1	2.4.1 Bypass Blocks
Components on the website do not have a logical order when receiving keyboard focus	16	2.4.3 Focus Order
All active components do not have a visible indication when they receive keyboard focus	142	2.4.7 Focus Visible

Table 8 shows the results of a manual evaluation of the University of Indonesia homepage. The evaluation was conducted on October 4, 2025. Several accessibility issues were found, including 20 texts that do not have enough color contrast, 2 components cannot be accessed using the keyboard, there are no bypass blocks, 2 components do not have logical order when they receive keyboard focus, and 72 or all active components do not have a visible indication when they receive keyboard focus. 1 contrast error detected by automated tools does not categorized as an error when evaluated manually.

Table 8 Manual evaluation result of university of indonesia's homepage

Errors	Total	Success Criteria
The text does not have enough color contrast	20	1.4.3 Contrast (Minimum)
Unable to navigate/select some menus using keyboard	2	2.1.1 Keyboard
No bypass blocks	1	2.4.1 Bypass Blocks
Components on the website do not have a logical order when receiving keyboard focus	2	2.4.3 Focus Order
All active components do not have a visible indication when they receive keyboard focus	72	2.4.7 Focus Visible

Table 9 shows the results of a manual evaluation of the Binus University homepage. The evaluation was conducted on October 4, 2025. After conducting a manual evaluation, the total contrast errors used are 66 contrast errors from a total of 67 contrast errors detected by automated tools. It is because there was 1 contrast error detected by WAVE, only visible when CSS is disabled. There were 37 non-text content did not have enough color contrast, 5 components were inaccessible with the keyboard, there were no bypass blocks, 5 components did not have a logical order when

receiving keyboard focus, and 5 active components did not have a visible indication when receiving keyboard focus.

Table 9 Manual evaluation result of binus university's homepage

Errors	Total	Success Criteria
The text does not have enough color contrast	66	1.4.3 Contrast (Minimum)
The non-text content does not have enough color contrast	37	1.4.11 Non-text Contrast
Unable to navigate/select some menus using keyboard	5	2.1.1 Keyboard
No Bypass Blocks	1	2.4.1 Bypass Blocks
Components on the website do not have a logical order when receiving keyboard focus	5	2.4.3 Focus Order
Some active components do not have a visible indication when received keyboard focus	5	2.4.7 Focus Visible

Table 10 is the result of a manual evaluation of the Airlangga University homepage. The evaluation was conducted on September 22, 2025. There are several accessibility issues found. The total contrast errors detected by automated tools are 28, but after conducting manual evaluation, there are 4 contrast errors detected by WAVE are visually hidden, and it is only visible when CSS is disabled. Likewise, there are 9 contrast errors detected on WAVE, however not categorized as contrast errors when tested manually. One contrast error found manually and did not detected by automated tools. The total contrast errors used are 16. Therefore, 1 non-text content does not have enough color contrast, there are no bypass blocks, 4 components do not have a logical order when accessed using the keyboard, 16 active components do not have a visible indication when they get keyboard focus, and 11 components do not meet the minimum size target of 24 x 24 pixels.

Table 10 Manual evaluation result of airlangga university's homepage

Errors	Total	Success Criteria
The text does not have enough color contrast	16	1.4.3 Contrast (Minimum)
The non-text content does not have enough color contrast	1	1.4.11 Non-text Contrast
No bypass blocks	1	2.4.1 Bypass Blocks
Components on the website do not have a logical order when receiving keyboard focus	4	2.4.3 Focus Order
Some active components do not have a visible indication when receive keyboard focus	16	2.4.7 Focus Visible
Some elements not comply with minimum target size 24 x 24 pixel	11	2.5.8 Target Size (Minimum)

Table 11 is the result of a manual evaluation of the Padjajaran University homepage. The evaluation was conducted on September 22, 2025. Several accessibility issues found include, 10 texts do not have enough color contrast, 8 components cannot be accessed using the keyboard, there are no bypass blocks, 7 components do not have a logical order when accessed using the keyboard, 6 active components do not have a visible indication when they get keyboard focus, and 3 components do not meet the minimum size target of 24 x 24 pixels.

Table 11 Manual evaluation result of padjajaran university's homepage

Errors	Total	Success Criteria
The text does not have enough color contrast	10	1.4.3 Contrast (Minimum)
Unable to navigate/select some menus using	8	2.1.1 Keyboard

Errors	Total	Success Criteria
keyboard		
No bypass blocks	1	2.4.1 Bypass Blocks
Components on the website do not have a logical ordder when receiving keyboard focus	7	2.4.3 Focus Order
Some active components do not have a visible indication when received keyboard focus	6	2.4.7 Focus Visible
Some elements not comply with minimum target size 24 x 24 pixel	3	2.5.8 Target Size (Minimum)

Manual evaluation was conducted to verify the validity of errors detected by automated tools. Furthermore, manual evaluation was also conducted to identify errors that could not be detected by automated tools. After manual measurement, there were seven types of issues detected. Broken skip link errors detected by the WAVE tool are classified as bypass blocks errors. Broken ARIA menu errors detected by the WAVE tool are classified as errors unable to navigate to some menus using keyboard navigation. All contrast errors detected through automatic evaluation have been evaluated manually, and the results are shown in the table below. Table 12 below shows the final measurement results after manual evaluation.

Table 12 All errors from manual evaluation of five universities homepage

Errors	UGM	UI	BINUS	UNAIR	UNPAD
The text does not have enough color contrast	50	20	66	16	10
The non-text content does not have enough color contrast	-	-	37	1	-
Unable to navigate to some menu using keyboard navigation	9	2	5	-	8
No/not working bypass blocks	1	1	1	1	1
Components on the website do not have a logical order when receiving keyboard focus	16	2	5	4	7
Active components do not have a visible indication when received keyboard focus	142	72	5	16	6
Some elements do not comply with minimum target size 24 x 24 pixel	-	-	-	11	3
Total	218	97	119	49	35

The table above shows that Gadjah Mada University (UGM) has a total of 218 errors obtained from manual evaluation. Followed by Binus University (BINUS) has a total of 119 errors, University of Indonesia (UI) has 97 errors, Airlangga University (UNAIR) has 49 errors, and Padjajaran University (UNPAD) has 35 errors.

The text does not have enough color contrast is the same error as the contrast error found in the automated evaluation. Contrast errors violate success criteria 1.4.3 Contrast (Minimum), which requires text components to have a contrast ratio of 4.5:1 or greater for small text, and 3:1 for large text (18 pt or greater, 14 pt bold). This issue was identified manually using the color contrast analyzer by Accessibility Insights. The results show that the contrast errors detected by the automated tool are indeed problematic. In addition, several contrast errors were found that were not detected by the automated tool. All universities have this type of error on their website homepages. The university homepage with the most contrast errors was the Binus University homepage, with 66 contrast errors. These issues might affect users with color blindness or color vision deficiency in seeing objects clearly.

Contrast issues also occur in non-text content. This condition does not comply with success criteria 1.4.11 Non-text Contrast, which requires non-text content to have a contrast value of 3:1 or more. The universities that have the following issues are Binus University and Airlangga University.

Unable to navigate to some menu using keyboard navigation is an issue where the menu cannot be accessed using keyboard navigation. This condition does not comply with success criteria 2.1.1 Keyboard, which requires that all active components be accessible and operable using a keyboard. There must be a way for keyboard interface users to perform the same, or comparable actions to access/operate the content [26]. The universities that have the following issues are Gadjah Mada University, University of Indonesia, Binus University, and Padjajaran University.

No/not working bypass blocks is the same issue with broken skip link found from automated evaluation. It is an issue because the skip to main content feature is either missing or not working. Success Criteria 2.4.1 Bypass Blocks requires a web page to have a skip to main content feature. All five university homepages have bypass blocks issues. Gadjah Mada University has a Bypass Blocks feature on its website homepage, but it does not work. The other four universities do not have a bypass blocks feature. This condition requires users who operate the website using a keyboard to go through the same components repeatedly to access the main content they want. Figure 7 below shows the bypass blocks feature at Gadjah Mada University. As shown, there was a href=#content, which should navigate the user to the main content when the skip to content feature is clicked. However, the target of href=#content was not found.

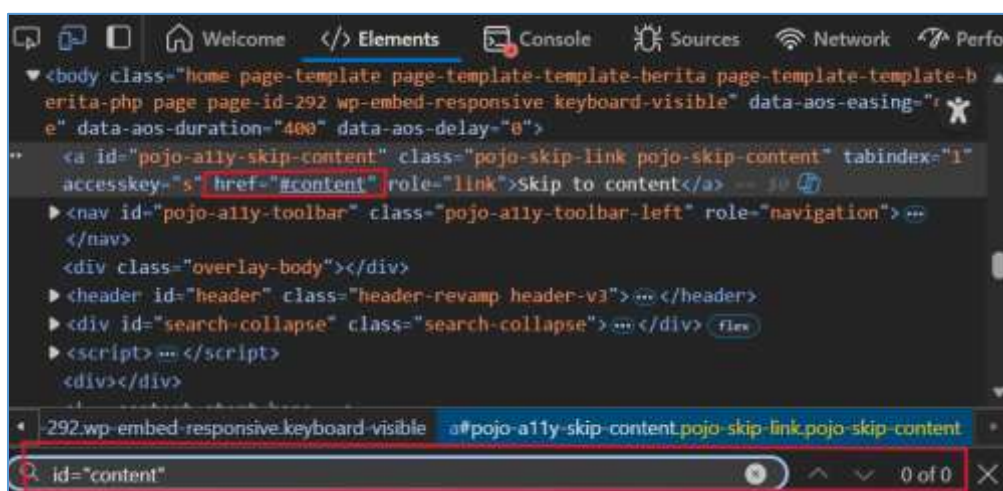


Figure 7 Target of skip to content does not exist

Components on the website do not have a logical order when receiving keyboard focus is a condition, when the website is operated using keyboard navigation, the components that receive focus must be in logical order (right to left and top to bottom). Universities that have focus order issues on their homepages are Gadjah Mada, Binus University, Airlangga University, and Padjajaran University. Figure 8 shows the focus order at Gadjah Mada University. The component with the red circle does not receive focus in the order it should. This condition can disrupt the concentration of users with attention deficit disorder and interfere with the navigation process of users who operate websites with a keyboard, especially users with limited movement.



Figure 8 Focus order on gadjah mada university’s homepage

Active components do not have a visible indication when receiving keyboard focus is a condition where components that receive keyboard focus do not show a visible indication. All university website homepages that were evaluated had focus visible issues. Figure 9 below shows one of the active components on the Gadjah Mada University website that receives keyboard focus but does not show a visible indication that the component is receiving keyboard focus. The “Mahasiswa” menu is receiving keyboard focus, but there is no visible indication that the component is receiving focus. This condition can cause users to become confused or forget the position of the keyboard focus. Affected users are those with attention deficit and those with limited movement who operate the website using a keyboard.



Figure 9 Focus visible on gadjah mada university’s homepage

Some elements do not comply with the minimum target size of 24 x 24 pixels, which is a condition where the size of an active component does not meet the minimum size of 24 x 24 pixels. The target size is the area that can be clicked. There are two university homepages that have components with a target size below the WCAG standard. Airlangga University has 11 active components with a target size of less than 24 x 24 pixels. Padjajaran University has 3 active components with a target size less than 24 x 24 pixels. This condition can make it difficult for users with limited movement to access the menu because the click target is too small.

Here are examples of recommendations for each type of issue. The relevant university and other universities can refer to the following recommendations to meet WCAG 2.2 accessibility standards. The recommendation for text color contrast issues is to ensure that the color combination between text and background meets a minimum contrast ratio. Figure 10 shows an example of a fix for the text component “Visual Communication Design (@Semarang)” on the Binus University website, which

<http://sistemasi.ftik.unisi.ac.id>

previously had low color contrast. Initially, the contrast ratio was only 2.33:1 with the color combination of #FFFFFF and the background color #7CAEE2. After adjusting the color combination through inspect element, the contrast ratio increased to 4.6:1 with the color combination of #FFFFFF and #2F7BAD, which meets the minimum WCAG requirements.

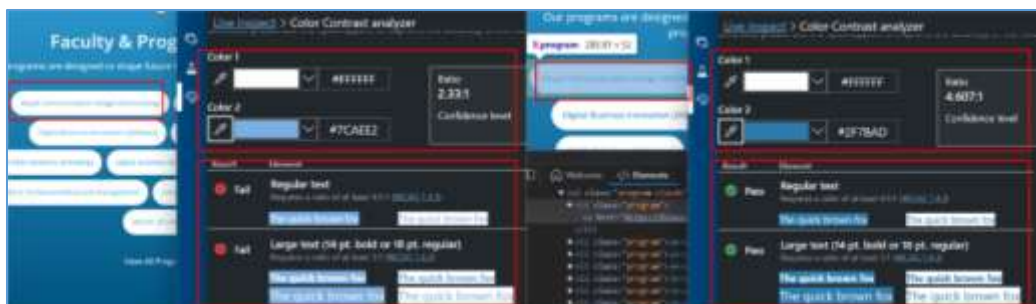


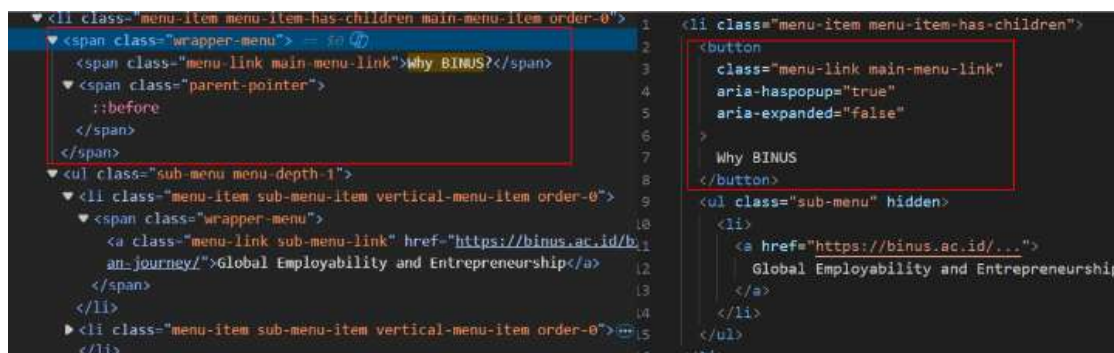
Figure 10 Recommendation example for text contrast issues

The recommendation for non-text contrast with insufficient contrast is to ensure that the color combination between non-text component and its background meets a minimum contrast ratio of 3:1. Figure 11 shows an example of a fix for the next button on Binus University website. Initially, the contrast ratio was 2.89:1 with the color combination of #E17F18 and #FFFFFF. After adjusting the color combination through inspect element, the contrast ratio increased to 3.27:1 with color combination #D97300 and #FFFFFF.



Figure 11 Recommendation example for non-text contrast issues

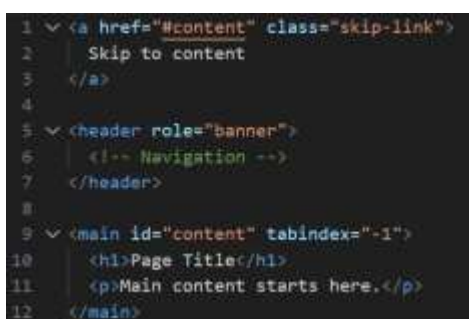
The recommendation for issues related to unable to navigate to some menu using keyboard navigation is recommended to use semantic HTML elements such as <button> or <a>, because these elements inherently support keyboard interaction. If custom elements such as <div> or are used, the tabindex="0" attribute must be added so that they can be focused, as well as a keydown event handler to respond to key presses. One example of this issue is component dropdown “Why Binus?” on website Binus University. The dropdown menu was found to be inaccessible via keyboard navigation because the menu trigger was implemented using a non-interactive HTML element (), which is not focusable by default. To address this issue, it is recommended to use semantic interactive elements such as <button> or <a> for dropdown triggers, or ensure keyboard focusability through appropriate tabindex usage. Additionally, keyboard event handling and ARIA attributes (e.g., aria-haspopup, aria-expanded) should be implemented to improve accessibility for keyboard and assistive technology users. Figure 12 below shows the details of these issues and the recommendation.



```
1 <li class="menu-item menu-item-has-children main-menu-item order-0">
2   <span class="wrapper-menu">
3     <span class="menu-link main-menu-link">Why BINUS</span>
4     <span class="parent-pointer">
5       ::before
6     </span>
7   </span>
8   <ul class="sub-menu menu-depth-1">
9     <li class="menu-item sub-menu-item vertical-menu-item order-0">
10      <span class="wrapper-menu">
11        <a class="menu-link sub-menu-link" href="https://binus.ac.id/b...
12        an-journey/">Global Employability and Entrepreneurship</a>
13      </span>
14    </li>
15  </ul>
16 </li>
```

Figure 12 Recommendation example for inaccessible component using keyboard

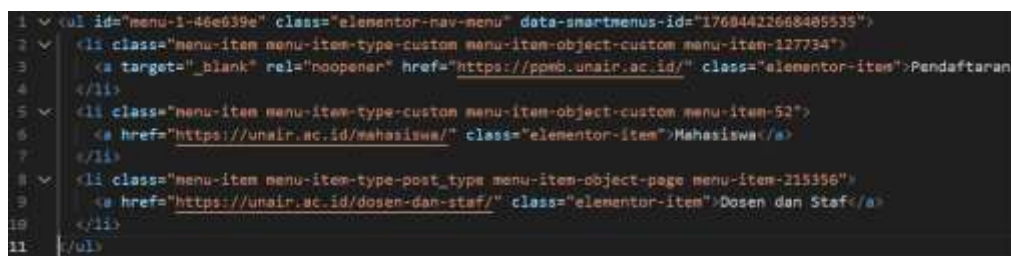
The recommendation for issues related to no/not working bypass blocks is to add a skip to main content feature on their websites that allows users to go directly to the main content, as well as define semantic landmarks such as `<nav>` and `<main>` to support quick navigation for users of assistive technologies. Make sure the skip to main content feature works well by providing a valid target for the skip to main content feature. Based on the issue found on UGM's homepage, there is a skip link referencing `#content`, but no corresponding element with this ID was found on the page. To resolve this issue, it is recommended to define a valid main content container using `<main id="content">` and ensure keyboard focusability by adding `tabindex="-1"`. Figure 13 below shows the details of the recommendation for issues related to bypass blocks.



```
1 <a href="#content" class="skip-link">
2   Skip to content
3 </a>
4
5 <header role="banner">
6   <!-- Navigation -->
7 </header>
8
9 <main id="content" tabindex="-1">
10   <h1>Page Title</h1>
11   <p>Main content starts here.</p>
12 </main>
```

Figure 13 Recommendation example for no/not working bypass blocks

The recommendation for Components does not have a logical order when receiving keyboard focus. Developers need to avoid confusing focus jumps or jumps to irrelevant areas. Make the DOM order match the visual order. Figure 14 below shows one example of a component at Airlangga University with unlogical focus order. It uses `"flex-wrap: wrap"` to arrange the position of elements based on the available space, not the DOM order. So, in the following case, what is displayed is "Pendaftaran", "Dosen dan Staf", and "Mahasiswa", which are supposed to be "Pendaftaran", "Mahasiswa", and "Dosen dan Staf". The recommendation is to remove the wrap by using `"flex-wrap: nowrap."`



```
1 <ul id="menu-1-48e639e" class="elementor-nav-menu" data-smartmenus-id="1768442268848535">
2   <li class="menu-item menu-item-type-custom menu-item-object-custom menu-item-127734">
3     <a target="_blank" rel="noopener" href="https://ppmb.unair.ac.id/" class="elementor-item">Pendaftaran<
4     </li>
5   <li class="menu-item menu-item-type-custom menu-item-object-custom menu-item-52">
6     <a href="https://unair.ac.id/mahasiswa/" class="elementor-item">Mahasiswa</a>
7     </li>
8   <li class="menu-item menu-item-type-post_type menu-item-object-page menu-item-215356">
9     <a href="https://unair.ac.id/dosen-dan-staf/" class="elementor-item">Dosen dan Staf</a>
10    </li>
11 </ul>
```

Figure 14 Recommendation example for unlogical focus order

The recommendation for Active components do not have a visible indication when received keyboard focus is to add visible indications to elements when they receive keyboard focus. Ensure that every interaction performed by users via the keyboard provides clear and consistent visual

feedback. It is recommended to provide a visible focus indicator for all interactive components using the “:focus-visible” pseudo-class. Figure 15 show the recommendation example for this issue.

```
1 a:focus-visible,  
2 button:focus-visible,  
3 input:focus-visible {  
4   outline: 3px solid #005fcc;  
5   outline-offset: 2px;  
6 }
```

Figure 15 Recommendation for active component without visible indication

The recommendation for Components that do not comply with the minimum target size 24 x 24 pixels is to increase the clickable area by adding sufficient vertical padding or by setting a minimum height on the interactive element. Additionally, it can be done by expanding the hit area using an invisible padding technique without altering the visual appearance. Figure 16 shows the “Pendaftaran” component on Airlangga University’s homepage with a target size of 389.4 x 2 pixels. It is recommended to add “padding: 12px 16px;” and a minimum height of 24 px may be applied as a fallback to ensure compliance under different layout conditions.



Figure 16 Recommendation for components that do not meet minimum target size

5 Conclusion

This accessibility evaluation on five of the most frequently accessed university websites in Indonesia, based on the Similarweb rank 2025 using WCAG 2.2 (AA) as a reference. Gadjah Mada University had the homepage with the most accessibility issues, followed by Binus University, University of Indonesia, Airlangga University, and Padjajaran University. The university homepages with the most types of issues were Binus University, Airlangga University, and Padjajaran University, with a total of six types of issues. This was followed by Gadjah Mada University and the University of Indonesia with five types of issues. The most frequently found accessibility violations were those related to contrast errors. Most of the issues were found through manual evaluation. This shows that evaluation with automated tools alone is not sufficient, manual evaluation involving human understanding and judgment is necessary. This research contributes to the discovery of several accessibility violations that were not detected by automated tools. This study has several limitations: (1) Did not involve people with disabilities. Therefore, the perspectives of actual users were not fully represented. Future research is recommended to involve people with disabilities. The approach by [27], which uses task scenarios, questionnaires, and interviews, can be adopted in the evaluation of users with disabilities. (2) Limited to the top five university websites based on the similarweb platform. Future research should evaluate more than five websites to get diverse results and a more reliable comparison of accessibility practices across different academic institutions. (3) The calculation of the result for each tool is still done manually. Future research could develop tools or methods capable of combining error results from various accessibility evaluation tools, especially for errors that are the same but have different labels.

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