

# Protocol for Curating Accessible OER

By National Center for AEM at CAST

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## **Defining Open Educational Resources**

In the [2017 National Education Technology Plan](#), the U.S. Department of Education defines open educational resources (OER) as teaching, learning, and research resources that reside in the public domain or have been released under a license that permits their free use, reuse, modification, and sharing with others. OER can include complete online courses, textbooks, documents, images, videos, and assessment items. This protocol itself is an example of an OER. It is licensed under a Creative Commons license (CC BY-SA 4.0). This license allows anyone to freely share and adapt the protocol as long as there is proper attribution to the authors and any new versions include the same license as the original.

## **Equity & OER: The Role of Accessibility**

The availability of high-quality OER plays an important role in addressing equity issues in education. For its full potential to be realized for every learner, however, OER must be more than openly licensed at a reasonable cost. They must also be usable across the variability that learners bring to any learning environment. For this to be the case, OER must be designed according to accessibility best practices that ensure they will work with the assistive technologies many learners with disabilities use to access the curriculum. As an added benefit, accessible OER are also often mobile-friendly, which is an important consideration for increasing participation through remote and distance learning. The AEM Center article, [Open Educational Resources: Ensuring Inclusive Learning in Uncertain Times](#), explores the relationship between OER, accessibility, and equity in more detail.

## **Background**

During 2019 and 2020, the AEM Center facilitated an Accessibility Community of Practice (CoP) with members of the #GoOpen Network. The goal of the CoP was to seek creative solutions to OER accessibility challenges. The work of the CoP contributed to the development of an earlier version of this curation protocol, which was based on the best practices outlined in the Accessibility Checklist in [ISKME's School Librarian OER Curation Framework](#).

The expansion of remote and hybrid learning offerings, and the challenges school districts will continue to face in making sure students with disabilities have accessible materials in a timely manner, make this updated protocol for curating accessible OER even more relevant and urgent for educators and families. [A Protocol for Creating Accessible OER](#) is also available to ensure educators are considering accessibility from

the start when creating or adapting OER. As companion documents, the two protocols provide educators with options for addressing the two pathways through which most OER are made available to learners - through either curation or creation.

## **Purpose & Use**

The purpose of the Protocol for Curating Accessible OER is to provide detailed yet easily implemented techniques for evaluating the accessibility of web-based OER. The protocol can be implemented by any educator who curates materials that will be shared with students and families to support learning.

The protocol is organized into four areas based on the core principles of the Web Content Accessibility Guidelines (WCAG), the international accessibility standard:

- Perceivable
- Operable
- Understandable
- Robust

Each principle has its own section of the protocol, which begins with its importance for OER accessibility. Step-by-step instructions with screenshots then show you how to apply related practices as you evaluate OER for accessibility.

This protocol is not intended as a substitute for a full audit of conformance to accessibility standards. No conformance claims should be made based on the use of this protocol.

Should you have any questions or suggestions for improving this resource, please contact the AEM Center team at [aem@cast.org](mailto:aem@cast.org).

## **Perceivable**

Content is perceivable when the information can be acquired in multiple ways, so that it does not rely on the use of only one of the human senses. For example, images require alternative equivalents such as text descriptions. For videos, an alternative equivalent example is closed captions. Perceivable content is also designed to be flexible and customizable because a single, fixed presentation of content is unlikely to meet the needs of all learners based on the variability they bring to a learning experience. A flexible presentation provides multiple ways for learners to independently customize the display of information to suit their unique needs and preferences.

## **Indicators of Best Practice for Perceivable: Images**

When curating images or other visuals that are perceivable, here's what to look for:

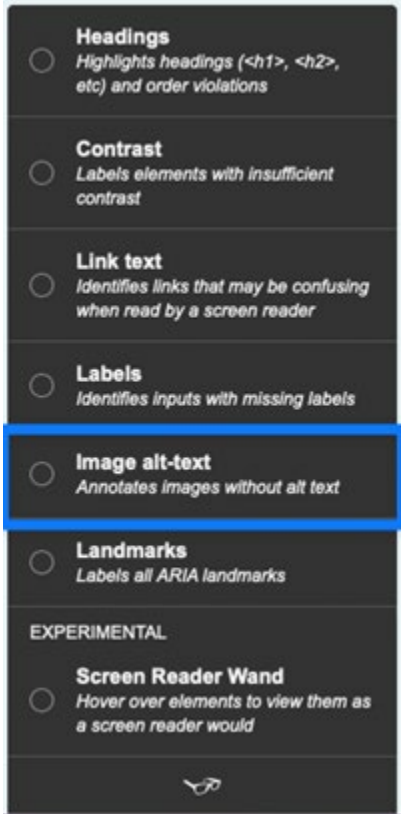
- Images that are essential for understanding the content include alt text. This is a concise description of the most important information an image conveys. The alt text should not include the generic text “image” or “graphic.” These generic terms in alt text create redundancy for users of screen readers, which already hear this information announced when navigating to each image in an accessible OER. Identifying specific types of images (e.g., cartoons, illustrations, etc.) can be helpful. A best practice is for the alt text to be no more than 150 characters in length.
- For images that are included in hyperlinks, the alt text informs the learner of the action that will take place when the link is selected, such as the name of the destination website.
- Complex images, such as charts and graphs, include both alt text and a long description that is available in the surrounding text or through a link that immediately follows the image.
- Images that are used purely for decoration are marked up in such a way that they can be skipped by screen readers.
- Images are not used to display text. Images of text may lose quality when resized. Additionally, images of text do not respond to the display adjustments some learners need to read content.

## **Perceivable: Skills for Reviewing the Use of Images**

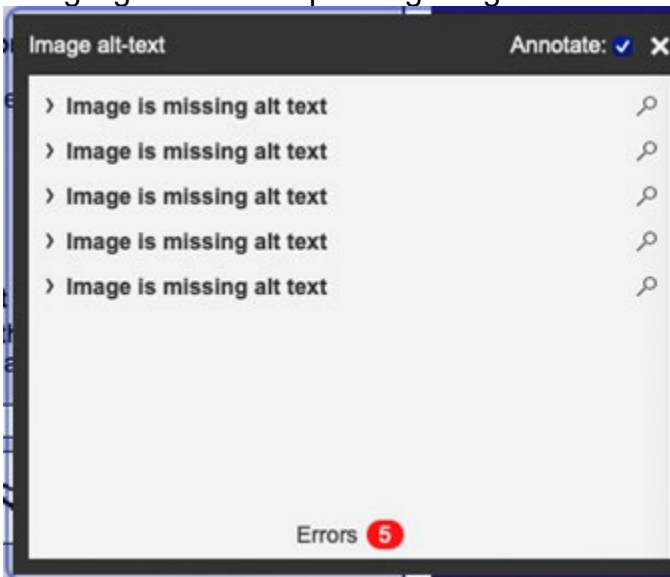
The free [tota11y bookmarklet](#) from Khan academy can help you quickly identify any images in web-based resources that are missing alt text:

- Launch tota11y by opening the bookmark in your web browser.
- Select the tota11y icon (eyeglasses) at the bottom of the web browser window.

- Choose “Image alt-text” from the tota11y menu. A pane will open on the right side of the screen if any images with missing alt text are identified.

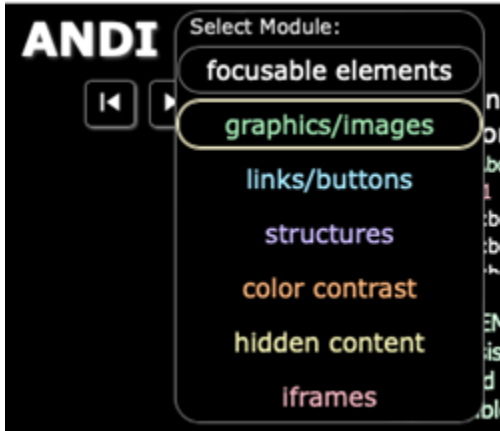


- Expand each “Image is missing alt text” item to read a more detailed explanation of the error related to missing alt text. Select the magnifier icon next to each error to highlight the corresponding image on the web page.

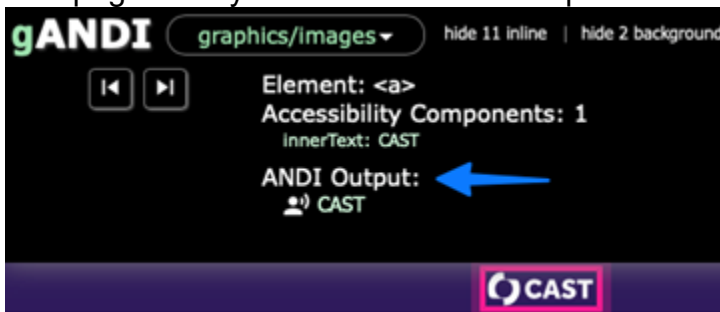


Note that the tota11y bookmarklet only checks for images that are missing alt text, which is a good first step. To check the accuracy of the provided alt text, use the [Accessible Name and Description Inspector \(ANDI\)](#), a free tool from the Social Security Administration. Like tota11y, ANDI is installed as a bookmarklet on your web browser. To check the alt text for an image with ANDI:

1. Launch ANDI by opening the bookmark in your web browser.
2. Select the “Graphics/Images” module from the ANDI modules dropdown menu.



3. Use the Next and Previous buttons in the ANDI “graphics/images” module to navigate through the images on the web page. You can also simply point your pointer at an image.
4. Review the text presented next to “ANDI Output” to determine if it accurately describes the selected image. If the output is empty, make sure the image on the web page is truly decorative and not required for understanding the content.



Checking for accurate and useful alt text is both an art and a science. It requires some subjectivity because the appropriate alt text will require consideration of the purpose for selecting an image and the context in which it is used. Given that identifying high-quality alt text is a skill that is improved with practice and in collaboration with others, the AEM Center recommends approaching the evaluation of alt text and long description as a group activity.

Images generally fall into three broad categories:

- **Informative** images are essential for understanding the information presented in an OER. These need to have concise descriptions that start with a broad overview of the key information, followed by key details. The details in the description will depend on the purpose or goal of the image.
- **Functional** images are part of a link and should provide a description of the destination of the link or the action that will take place when the link is selected (e.g., downloading a file in another format).
- **Decorative** images are used to provide visual appeal and are not essential to understanding the content. These images should be marked up in such a way that they can be skipped by screen readers to reduce the “noise” in the content that is read aloud to blind or low vision learners.

The [alt Decision Tree](#) from the World Wide Web Consortium (W3C) can help you determine what kind of image is being described in an OER. As you review the alt text, consider the context where the image is used. Is the image already described in the surrounding text? If so, it should be treated as a decorative image to avoid redundant information being read aloud to screen reader users.

## **Indicators of Best Practice for Perceivable: Videos and Animation**

When curating videos and animation that are perceivable, here’s what to look for:

- Videos include high-quality captions that are not the unedited text that can be automatically generated on some platforms such as YouTube. The captions are accurate and synchronized to the dialogue in the video and include descriptions of sounds that are important for understanding the content. Speaker identification is provided for clarity when multiple people are featured in a video.
- A transcript is provided alongside the captioned video, or a link to the transcript is located near the video. The transcript includes descriptions of any information that is only communicated visually in the video, along with the dialogue and descriptions of sounds that are important for understanding the content.
- Audio descriptions are provided, either as a secondary track or as a separate video that can be accessed from a link near the non-described video.
- Videos and animations do not include blinking or flashing content that could trigger a seizure.
- Videos and animations do not play automatically, which prevents conflicts with screen reader technology.



## Perceivable: Skills for Reviewing Videos and Animation

The appropriate use of video and animation requires a content check. For video, make sure to play a segment at the beginning of the video as well as one selected at random. This can help you confirm that the quality of captioning and audio description is consistent throughout the video. Transcripts should also be checked for accuracy and clarity, even if they are created by a provider that promises high accuracy. The quality can vary among the transcribers selected for each transcription job.

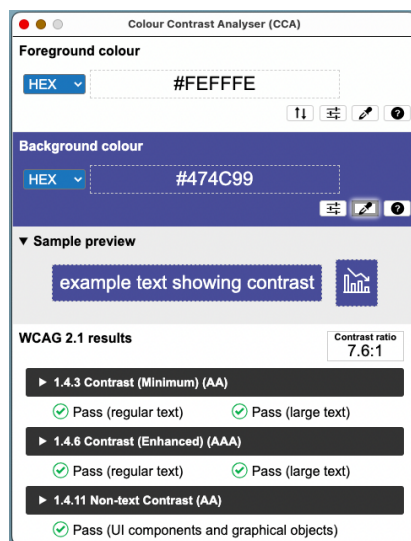
## Indicators of Best Practice for Perceivable: Use of Color

When curating OER that are perceivable, evaluate the use of color by looking for:

- Color combinations that meet color contrast requirements as determined through the use of a color contrast checker.
- Color that is not used alone to convey meaning. For complex images such as graphs, line style, shading or text labels are used in addition to color to convey meaning.
- Color and other sensory characteristics, such as shape, size, and location, that are not the only means for orienting learners as they follow instructions.

## Perceivable: Skills for Reviewing the Use of Color

Use a free color contrast checker such as the [Colour Contrast Analyser \(CCA\)](#) from TPGi to make sure the choice of background and foreground colors meet the minimum contrast ratio requirements.



On Windows, CCA includes a color picker to allow you to select the foreground and background color combination that will be checked. On Mac, CCA will open the Mac's color picker tool when a color swatch is selected, but the functionality will be the same. Note that due to the Mac's stricter security system, you may have to provide screen recording permissions for CCA in your operating system's security preferences. This will allow CCA to accurately sample the colors on the screen. The option to check for color contrast is sometimes included in accessibility checkers for websites, such as [WAVE from WebAIM](#).

One way to check that color isn't used alone to convey meaning is to turn on the grayscale view in your operating system and confirm the content makes sense when color is removed. This option is especially helpful for reviewing charts and diagrams to make sure they include additional cues and do not rely on color alone for meaning.

The option to switch to a grayscale view will typically be found in the settings or system preferences of your operating system:

- **Windows 10:** Settings, Ease of Access, Color Filters.
- **Windows 11:** Settings, Accessibility, Color Filters.
- **iOS 13 or later (iPad and iPhone):** Settings, Accessibility, Display and Text Size, Color Filters
- **Mac:** System Preferences, Accessibility, Display
- **Chromebooks** don't have a grayscale option, but an extension such as [High Contrast](#) can provide similar functionality for any content accessed through the Chrome web browser.

Along with using the grayscale display option, you should test the content with the high-contrast display option of your operating system. Check to make sure that no parts of an image disappear when the high-contrast option is turned on, which can happen if the image includes transparency.

## **Indicators of Best Practice for Perceivable: Typography and Layout**

When curating OER that are perceivable, evaluate the use of responsive typography and layout by looking for:

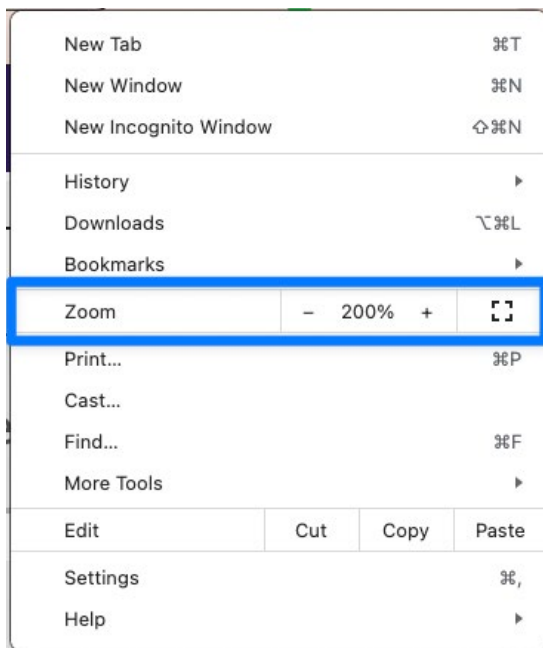
- Styling, such as making text bold or italic, that is not used alone to highlight the importance of information or call attention to it. Text (such as "Note:" or "Important:") is used in addition to styling. Text-to-speech technology may not be

set up to recognize changes in styling by default, but it can convey the information when it is provided as text.

- A baseline text size of no smaller than 12pt is used for body text.
- Text that is left-aligned rather than fully justified.
- The presentation of text that is not fixed but can be customized by learners (e.g., by adjusting the text size or selecting different fonts). Images of text, which do not respond to presentation changes, are avoided.
- Text that can be resized to 200% without any loss of content (e.g., text that overlaps or is cut off).
- Layout of content that is responsive and works on smaller screens such as those found on smartphones and tablets. Text should reflow to accommodate the smaller display without requiring scrolling in the direction you are reading.

## **Perceivable: Skills for Reviewing Typography and Layout**

Evaluating the use of typography requires a content check. To check the responsiveness of the layout, use a browser such as Chrome or Edge, which provide an indication of the zoom (magnification) level. Set the zoom level to 200% and make sure there is no loss of functionality or content at that zoom level.



You should also open the content on a smartphone and check to make sure content reflows to fit the smaller screen without requiring scrolling in the direction you are reading.

## **Operable**

Operable content provides flexibility in how learners navigate and interact with the content via a mouse, a keyboard or even voice commands. For example, learners with visual impairments may not be able to use a mouse to select options on the screen, but they can use keyboard shortcuts or touch gestures to navigate the content using the section headings. Others may prefer the keyboard because they are able to navigate faster with it. Operable content is also organized in a logical way that improves navigation for screen reader users and supports understanding for everyone.

### **Indicators of Best Practice for Operable: Keyboard Accessibility**

When curating OER that are operable, evaluate for keyboard accessibility by looking for:

- All interactive elements (such as form fields and hyperlinks) can be reached and activated using only the keyboard. This includes the controls in video players and animations.
- For menus, it is possible to get “to, through, and out.” That is, you should be able to enter the menu, navigate through its options, and close it using only the keyboard.
- As you navigate with the keyboard, a visual focus indicator helps you track the currently selected item.
- The keyboard focus moves around the page in a logical order (e.g., a field that asks for first name is not followed by one for the address before returning to last name).
- There are no “keyboard traps” that keep you from advancing through the content as you navigate using only the keyboard.

### **Operable: Skills for Reviewing Keyboard Accessibility**

The [No Mouse Challenge](#) is an activity that can help you learn how to test for keyboard accessibility. Note that on the Mac, additional steps are required before you can complete this challenge. You will need to enable full keyboard accessibility for Safari by going to Safari, Preferences, Advanced, and choosing the “Press tab to highlight each item on a web page” option under Accessibility.

## **Indicators of Best Practice for Operable: Links**

When curating OER that are operable, evaluate the clarity of links by looking for:

- Links that make sense on their own, without the surrounding text for context, and they should not use generic language such as “click here,” “about,” or “learn more.”
- Links that avoid the use of full web addresses as the link text. To provide a better experience for those listening with screen readers, the full web address is hidden behind more descriptive link text, or a link shortener is used (with a descriptive custom back half).
- Links that prepare the reader for any unexpected actions such as the opening of a new window or tab, or the downloading of a file.

## **Operable: Skills for Reviewing Link Quality**

You may need to do a content review by scanning the document or website and flagging any links that do not follow best practices for meaningful, descriptive links. Some issues, such as links that use generic language (e.g., “click here”) or a full web address as the link text, will be easy to spot. Others, such as links that open new windows without warning, may require more careful testing; follow the link to confirm the action that results from selecting it.

## **Indicators of Best Practice for Operable: Navigation**

When curating OER that are operable, evaluate the navigation options by looking for:

- A concise title on each page that accurately describes the contents of the page. The page title is unique, and the unique information is placed first (e.g., Getting Started: AEM Center, as opposed to AEM Center: Getting Started). A best practice is for the page title and the first heading to match.
- Content that is organized into sections, and each section starts with a unique heading or subheading that succinctly describes what the section is about.
- Headings that are created with proper markup (heading tags) rather than styling that only changes the appearance of the heading text. Without the proper markup, the headings may not be exposed to assistive technologies.
- Headings and subheadings that are used sequentially (e.g., Heading 1, Heading 2, etc.) to create a logical heading structure. Typically, a web page should have only one Level 1 Heading (H1) for the page/document title, with a Level 2

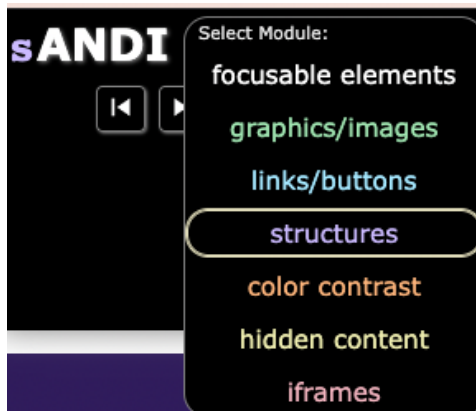
Heading (H2) used for the major sections, a Level 3 Heading (H3) for the subsections, and so on.

- A way to skip repetitive content. This can take the form of a “skip to main content” link that is either always visible or shown when it gets keyboard focus. This link should be the first item on the page.

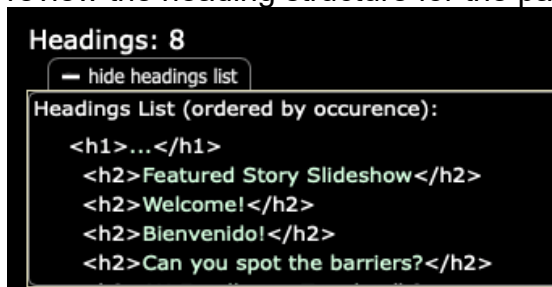
## Operable: Skills for Reviewing Navigation Flexibility

To review the heading structure of a web page, use the [Accessible Name and Description Inspector \(ANDI\)](#) (introduced under “Perceivable: Reviewing the Use of Images”):

1. Launch ANDI by opening the bookmark for it in your web browser.
2. Select the “Structures” module from the ANDI dropdown menu.

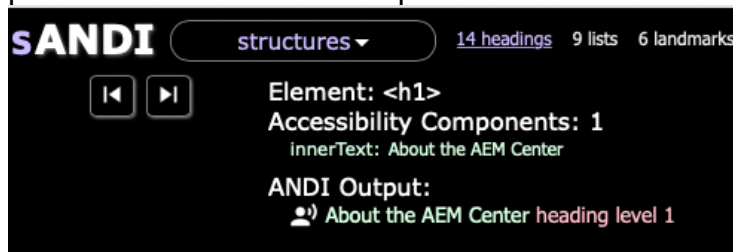


3. With the “headings” option selected, expand the “View headings list” option to review the heading structure for the page. Confirm it follows a logical order.



4. Use the Next and Previous buttons to navigate through the headings. This provides a preview of the information a screen reader would read aloud, which is

presented under “ANDI Output.”



The page title is typically shown at the top of the current window or tab in the web browser. You can also use the “more details” option in the ANDI Structures module to view it in a dialog window.

To check that a way to skip repetitive content is provided, follow the instructions for the [No Mouse Challenge](#) (see Operable: Reviewing Keyboard Accessibility). Make sure a “skip to main content” link is provided as the first item on the page that gets keyboard focus. Activate this link and make sure it actually takes you to the main section of the page, which usually starts with a first level heading (H1).

## Understandable

When the design of content is understandable, learners can focus more of their effort on processing the information rather than working around barriers. Understandable content is designed to be intuitive and to behave in a predictable way. It relies on consistency and the use of conventions to make it easier for learners to figure out how the design works. It also includes support for the language variability each person brings to the learning experience.

## Indicators of Best Practice for Understandable: Reading Level and Language

When curating OER that are understandable, look for:

- Each web page has a language declaration to help screen readers and other text-to-speech technologies select language-appropriate voice and pronunciation rules. This will make the content easier to understand when it is read aloud.
- When content includes multiple languages, a language declaration is included for each phrase or section that is in a different language.
- The reading level is appropriate for the intended audience. Alternatively, a summary or abstract is provided for technical information that requires a higher reading level.

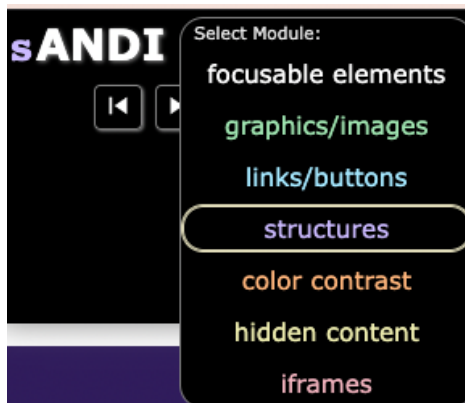
- Content is written according to [plain language guidelines](#) with minimal use of jargon.
- Abbreviations and acronyms are expanded the first time they appear on a page.
- The placement and identification of navigation and other repeated elements is consistent across the website.
- Form fields provide sufficient information about expected formats to help users avoid mistakes.
- When mistakes are made, errors are clearly presented near the corresponding form field in a way that does not rely on color or other sensory characteristics.

## Understandable: Skills for Reviewing Reading Level and Language

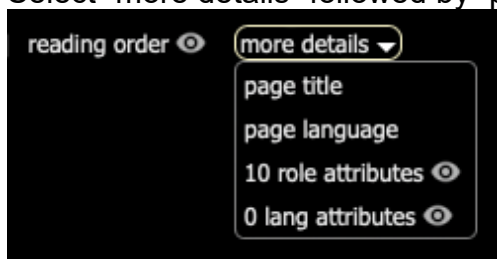
Checking a resource to make sure it is understandable will require a careful reading of the content, including any directions and labels for forms. To review the reading level, copy and paste content into an online tool such as the Hemingway Editor or the Readability Analyzer. Sometimes the tool will provide tips to help you improve the clarity of your writing for any audience.

To check if a valid language code has been provided for each page, use the Accessible Name and Description Inspector (ANDI):

1. Launch ANDI by opening the bookmark for it in your web browser.
2. Select the “Structures” module from the ANDI module dropdown menu.



3. Select “more details” followed by “page language.”





4. Review the attribute value provided in the dialog window to make sure it matches one of the valid language codes. For English, the value should be “en” or “en-us.”

To review the language of content that is in a different language, select “lang attributes” from the “more details” menu in ANDI. A yellow box with the language code will appear above content that includes a language attribute.



## Robust

Robust content works in a variety of web browsers and devices, including tablets and smartphones. It also applies to the assistive technologies many people with disabilities use, including screen readers.

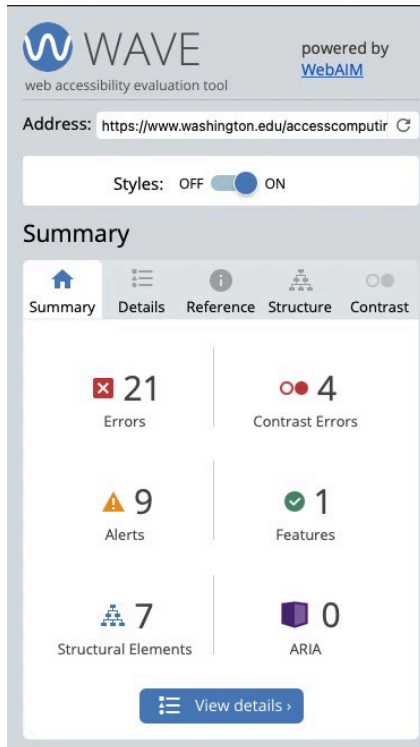
Ideally, you would enlist someone who uses assistive technology to test a resource for accessibility; however, this may not always be practical. At a minimum, you should use an automated accessibility checker. Just keep in mind that even the best of these automated accessibility checking tools have limitations due to the subjective nature of many accessibility techniques. As long as you keep these limitations in mind and don't see automated checkers as a replacement for learning accessibility best practices, they can make a valuable contribution to your accessibility work. The best automated checkers include extensive guidance on how to fix identified errors. Make it a habit to review this guidance and it will help you continue to learn about accessibility over time.

## Robust: Skills for Reviewing Accessibility with a Checker

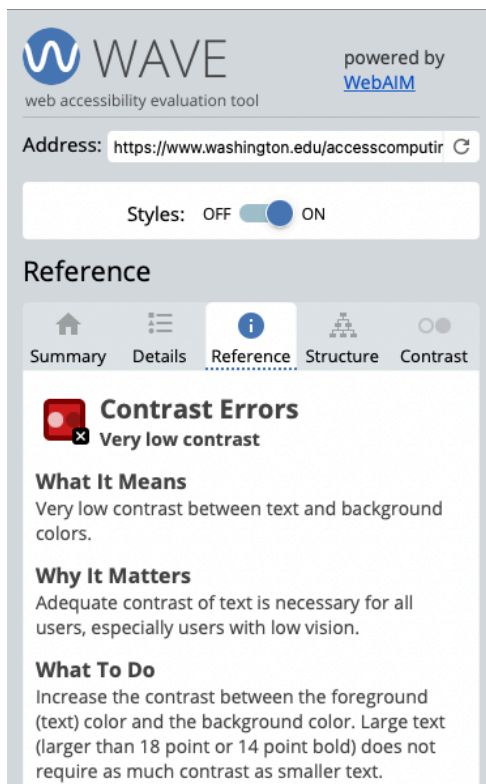
The WAVE accessibility checker from WebAIM can check the accessibility of a single web page for free. Run an accessibility check with WAVE in one of the two following ways:

- By going to the [WAVE website](#) and entering the web address of the web page
- Opening the page in the web browser and launching one of the [WAVE browser extensions](#) available for Google Chrome, Microsoft Edge, and Firefox.

A [WAVE tutorial from WebAIM](#) explains how to interpret the results after running the WAVE accessibility checker.



WAVE includes a robust web accessibility reference that provides detailed explanations for each error.



## **Additional Resources from the National AEM Center**

The following resources on the AEM Center website provide additional information on accessibility best practices:

- [Vetting for Accessibility](#)
- [Designing for Accessibility with POUR](#)
- [Creating Accessible Documents](#)
- [Creating Accessible Publications with EPUB](#)
- [Creating Accessible Video](#)
- [Creating Accessible STEM](#)
- [Creating Accessible Websites](#)
- [Creating Accessible Social Media Posts](#)

## **Acknowledgments**

The AEM Center would like to thank the following members of the #GoOpen Accessibility Community of Practice for their contributions to the development of this resource:

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- Amee Godwin, ISKME, provided guidance, feedback, and support throughout the development of the protocol.