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Including Inclusion

Guiding Instructors on Universal Design

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Definitions:

Universal Design of Instruction (UDI) – Universal Design of Instruction (UDI) is the design of instruction that can be used by all students without the need for adaption. This design includes instructional materials, facilities, and strategies (Burgstahler, 2010).

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Introduction and Purpose

What's this guide all about?

Universal Design (UD) is a fundamental aspect of accessibility and inclusion practices. Through Universal Design and its various counterparts, we can create a more inclusive world that provides the same opportunities to any individual, regardless of ability. We can accommodate for varying levels of ability in our work and in the pieces of media we offer, and we can broaden our audience by thinking of different ability levels while creating our works, creating with accessibility in mind. When it comes to teaching UD principles, the principles themselves are no less important. Often, when providing materials to guide educators or workers in Universal Design practices, we can forget to make these materials Universally Designed themselves. We can end up creating an article or training document that teaches universal design practices in a singularly designed way, alienating individuals that may be the most passionate about the document that we've created. It's important that we don't forget why we are teaching Universal Design to others, to help provide equal opportunities to everyone, regardless of ability. This guide will seek to help you create multiple forms of media that are themselves Universally Designed.

This guide will focus primarily on digital media. While Universal Design extends beyond digital formats, even to changes in the physical world, digital mediums are some of the most impacted areas when creating Universally Designed media. Many of the tips and principles outlined in this guide will be aimed towards media created for digital use. Some of the tips and principles in this guide will also extend beyond the digital realm,

and if this is the case these tips will be marked accordingly. This guide will touch on physical media such as print sources, and concepts such as designing physical spaces for learning, but we will spend most of our focus on the digital medium.

Refresher

Universal Design Principles

The best place to start would be refreshing on Universal Design principles. Sheryl Burgstahler in her book *Creating Inclusive Learning Opportunities in Higher Education: A Universal Design Toolkit* discusses that 7 Universal Design (UD) Principles, 3 Universal Design for Learning (UDL) principles, and 4 Web Content Accessibility Guidelines (WCAG) principles make up the total Universal Design for Higher Education (UDHE) framework (Burgstahler, 2020, p. 43). While this guide is designed for anyone, including those not in higher education fields, UDHE is a great framework to build upon for any media you create or teaching that you do. Burgstahler lists these rules as follows, for Universal Design:

1. Equitable use
2. Flexibility in use
3. *Simple and intuitive*
4. *Perceptible information*
5. *Tolerance for error*
6. *Low physical effort*
7. *Size and space for approach and use (Burgstahler, 2020, p. 43)*

For Universal Design for Learning, Burgstahler lists the following:

1. *Multiple means of engagement*
2. *Multiple means of representation*
3. *Multiple means of action and expression (Burgstahler, 2020, p.43)*

Finally, for Web Content Accessibility Guidelines, Burgstahler lists:

1. *Perceivable*
2. *Operable*

3. Understandable

4. Robust (Burgstahler, 2020, p.43)

With 14 total principles to keep track of and be concerned with it can be easy to forget to account for or overlook some principles when creating media. As we continue through this guide, we'll see many practical ways to include these principles in media, and how many of these principles interconnect, so that we can multitask and "kill two birds with one stone".

Creating a Universally Designed Document

How to Make an Accessible Document from Scratch

Often when creating documentation or writing for other instructors or individuals to teach them about Universal Design principles, we end up creating documents that are themselves not Universally Designed. We should aim to make everything we create Universally Designed, so that no one is unable to access our content. But how does one create an accessible document? Do we need to account for and accommodate for every possible disability? As Sheryl Burgstahler mentions in her book, we can attempt to accommodate for as many disabilities as possible, and we can create media that is as universally designed as possible, but even if we do both things, we still will not eradicate the need for accommodations (Burgstahler, 2020). Accommodations are special privileges or changes given to meet certain needs for people with disabilities (Lee, 2019). Still, though, we can design our media with the intent to avoid accommodations as much as possible and to preemptively accommodate for the widest audience possible (Burgstahler, 2020). To create an accessible document, make sure you account for the following practices if applicable:

1. Meaningful alternative text (alt text)

2. *Meaningful hyperlinks*
3. *Color contrast*
4. *Correct heading levels*
5. *Accessible tables*
6. *Accessible lists*

One should also note that though Universal Design does work together with accessibility, it is only part of accessibility goals and practices, and should not be confused with accessibility. As we investigate creating an accessible document, it is important to make this distinction, and to remember that though a document may be Universally Designed, this does not necessarily mean the document will also be accessible, and vice versa. This does not mean we should avoid one or the other, just that we should be careful to consider all practices and guidelines when trying to make our materials as inclusive as possible.

Alternative Text

With alternative text (often referred to as “alt text”), we notice the stipulation of “meaningful”, but what does that itself mean? What makes alt text meaningful, and what does good and bad examples look like? Why do we care about alt text at all? Alt text is important to provide sight-impaired audiences with the information we’re trying to convey when using images. Screen readers will denote an image as an image but won’t describe what the image is or what it’s trying to convey unless we use alt text (*Accessibility: image alt text best practices, 2021*). Siteimprove calls these kinds of images “informative images” and describes them in this way: “Informative images are any images that add to the context of a page. If the content of a page would suffer if an image was removed, then that image is informative and therefore needs an alt text.” (*Accessibility: image alt text best practices, 2021*). Siteimprove also suggests making your alt text less than 100 words, and that if you need to write more than that you

should consider placing what your image conveys in the content around the image and using a shorter alt text for the image to compliment the text (*Accessibility: image alt text best practices, 2021*). Siteimprove also mentions that “The alt text should match the tone of voice of the accompanying content” (*Accessibility: image alt text best practices, 2021*) and “alt text does not need to be an objective description, it can convey nuances, details, and emotions if they are relevant to the user experience” (*Accessibility: image alt text best practices, 2021*). Consider these ideas when providing alt text for images in your document, what is the tone of the surrounding text, and are there any nuances or specific details I’m trying to convey through this image?

Hyperlinks

Hyperlinks can be a great way to enhance your content or connect your audience with an outside source. Hyperlinks can send audience members to locations where they can learn more about a topic or take them to a portion of a website you’re showing them how to use. Hyperlinks can also enhance your content and can often be found in reference sections or citations and can help audiences know where your information came from. However, hyperlinks can also provide barriers and challenges to accessible audiences. Inaccessible hyperlinks can be confusing and annoying when screen readers read them out, or can appear untrustworthy if described vaguely, not painting a clear picture for the audience of where they’re going. When implementing hyperlinks into our resources, we’ll want to be sure to be careful of accessibility and readability so our audience can feel safe and confident in knowing what the hyperlink is for and where it will take them.

Web Accessibility in Mind (WebAIM, 2019) suggests avoiding the following phrases as hyperlink text:

- *click here*
- *here*
- *more*
- *read more*
- *link to [some link destination]*
- *info (WebAIM, 2019)*

We can see that many of these phrases, while readable, don't accurately tell the audience where they're going, and in some cases present redundancy. "Click here" becomes redundant, since many screen readers will announce the hyperlink as a hyperlink, ending up with the audience hearing "link text, click here". (Yale University, 2022) "Read more" may make sense with surrounding context, but where will the reader go, and what exactly will they read? Are they going to a credible site that has a strong resource on the topic they're looking at, or a less credible site that only provides a cursory glance at some of the information they've already seen? We can begin to see why descriptive hyperlinks are important, audiences may become confused or nervous about clicking on a link they don't trust and can't be confident where it will lead to.

For a comparison example, these sentences would be a bad example of a descriptive hyperlink: "Arapahoe Community College offers many types of classes for many different students. [Read more here.](#)" A better version of those sentences would be: "Arapahoe Community College provides many classes for many kinds of students. Visit [Arapahoe Community College's Course Catalog](#) to see what classes are offered." Comparing these sentences together, we can see that the second sentence clearly

and quickly conveys to the audience exactly where they're going and exactly what they can expect to see. We can also see that the context is provided within the link. While we have context surrounding the link, a screen reader user who may be tabbing through objects in a document will still understand where they're going if they only read the hyperlink text.

Readability is just as important as meaningfulness. WebAIM discusses that URLs present two types of challenges:

1. *Readability*
2. *Length (WebAIM, 2019)*

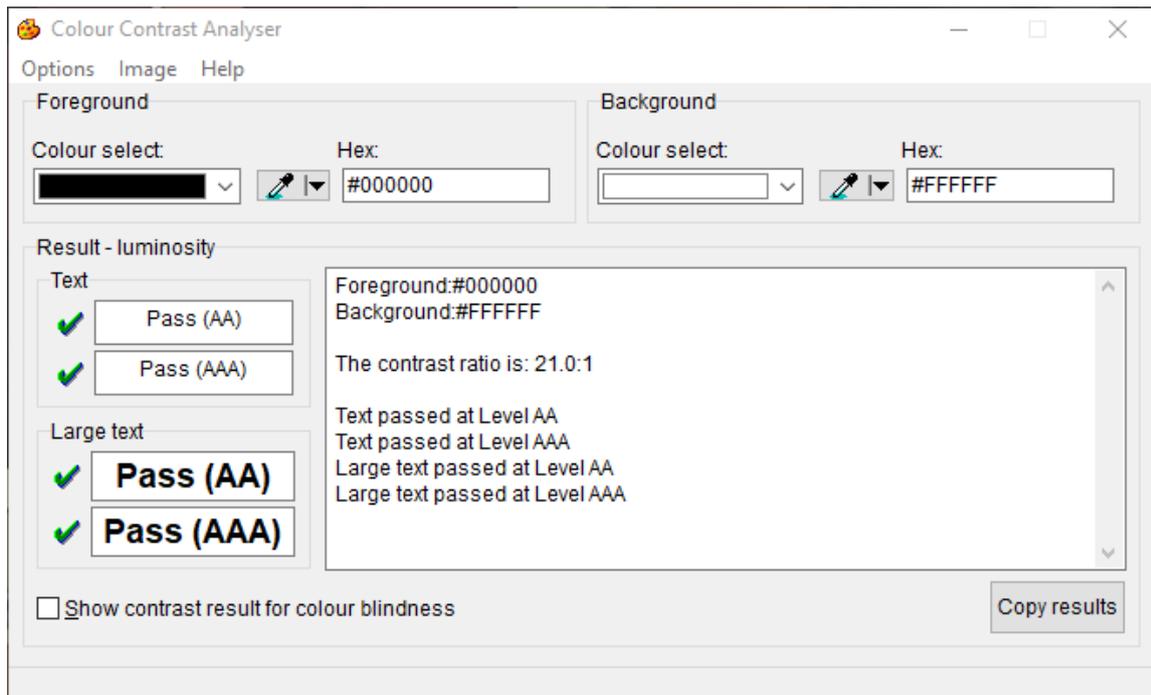
WebAIM also touches on the fact that many URLs are difficult for human readers to read, containing many random numbers, letters, and characters (WebAIM, 2019). When it comes to readability, WebAIM points out that many URLs are not readable or screen reader friendly (WebAIM, 2019). Being designed for coding and databases, URLs contain difficult combinations of letters, characters, and numbers (WebAIM, 2019). This makes for something that's difficult for sighted readers, but even more so for screen reader users, as a screen reader will attempt to read out the entire URL as it is, leading to a possibly long, annoying, and difficult to understand link experience (WebAIM, 2019). Connecting to our tips from before, this can add confusion as to where a student is going. An example of this can be seen using the link to a YouTube video. Say you wanted to provide a link in your guide that takes readers to a YouTube video on how to create an accessible PDF. A video link to that might look like this: <https://www.youtube.com/watch?v=ndNuOHeA4CI&t=73s>. A screen reader would then attempt to read the link as it sees it, reading each letter individually and each character individually (WebAIM, 2019).

This is a tamer example, but as links get longer, they become more unreadable. Even links that have descriptions of the content, such as this link:

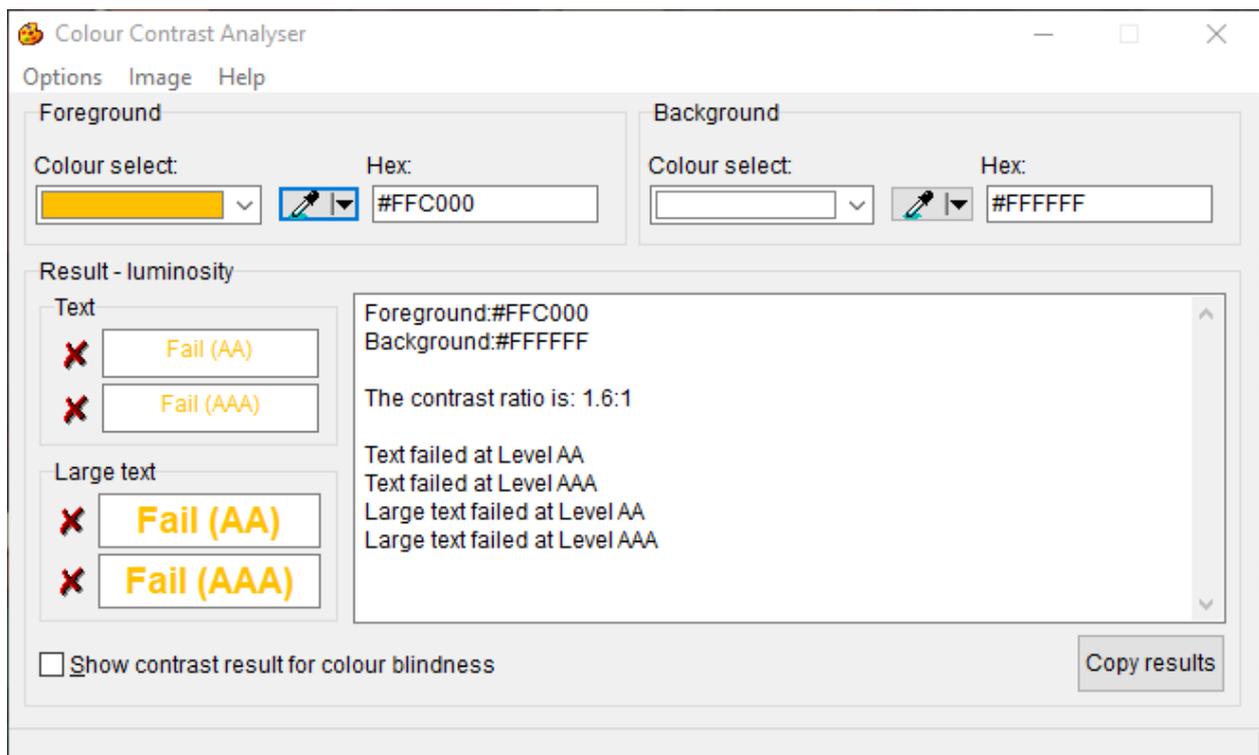
<https://www.americanprogress.org/article/ada-31-access-housing-health-care-must-meet-rise-disability-u-s/> still contain readability issues, considering that some screen readers will still read the hyphens and forward slashes (WebAIM, 2019). We can see as well from that link that some links tend to be much longer, and sometimes the accessible text we provide for links can get longer as well. WebAIM states that there “is no maximum allowable length of link text”, but that authors should focus primarily on making their links long enough to alert the user where they’ll be going (WebAIM, 2019). WebAIM also states that “as a general rule, links should be as concise as possible without sacrificing meaning” (WebAIM, 2019).

Color Contrast

Color contrast considerations are an important part of accessibility considerations. Vision impairments and color-blindness can affect how audiences interact with your media (Accessibility Guild, n.d.). The US Government’s site on Accessibility for Teams suggests ensuring that the color contrast of your text meets a standard ratio of 4.5:1 for small text and 3:1 for large text (Accessibility Guild, n.d.). The Accessibility for Teams site also suggests using WebAIM’s color contrast checker to check for this ratio (Accessibility Guild, n.d.). Here we can see what we’re looking for when using a color contrast analyzer:



We can see from this image that our black foreground and white background meet both AA and AAA standards at large and regular sizes. An example for poor color contrast would look like this. As you can see, the text is hard to make out and not easy to look at. Using a color contrast analyzer, we can see this text does not meet any accessibility standards:



The Accessibility for Teams sites also talks about using color to represent meaning in documents (Accessibility Guild, n.d.). They recommend ensuring that meaning can also be derived in other ways, such as “icons, written content, and other visual elements” to also convey meaning (Accessibility Guild, n.d.). For example, one may see instructions written as: “Complete content **outlined in red** by Thursday, and content **outlined in green** by Friday”. Instead, consider rewriting your instructions as: “Complete content **outlined in red and bolded** by Thursday, and content **outlined in green and underlined** by Friday”. The reason for multiple means of gathering meaning are for users who may be color-blind and don’t use a screen reader; a red-blue colorblind individual would not be able to differentiate the “red text” from any other text but could differentiate between bold or underlined text and normal text (Accessibility Guild, n.d.). Color contrast is also important for sighted users (WebAIM, 2021). Foreground and background colors that are similar or bright colors could present readability concerns for any user regardless of sighted ability (WebAIM, 2021). Further, a common color contrast area that creators like to use but still needs to be checked are gradients (WebAIM, 2021). Gradients can still present color contrast issues (especially as the background color becomes darker), and while WebAIM does not have specific suggestions for gradients, they do suggest testing for color contrast against the lightest point of the gradient to ensure accessible contrast (WebAIM, 2021).

Tables

Tables are a great way to provide data to users and can be a great way to show readers a large set of information in a simpler and/or more readable way. However, tables can quickly become complex and difficult to understand, especially so for screen-reader users. WebAIM discusses that “Sighted users can visually

scan a table. They can quickly make visual associations between data in the table and their appropriate row and/or column headers. Someone that cannot see the table cannot make these visual associations...” (WebAIM, 2017). With this in mind, it’s important to make sure that screen-reader users can easily and accurately navigate our tables and extrapolate the same information that sighted users can gather as well. An important concept to note as we discuss creating accessible tables is that we’ll only be touching on simple tables. Complex tables are something you may see, but are generally best avoided, as mentioned by W3C (W3C, 2019). This is because as tables become more complex, they become more difficult to make accessible and for users to understand and navigate.

Perhaps the most important aspect of an accessible table is the Table Headers. When navigating tables, it will be important for screen-reader users to understand what data the cell is referencing, which column does it belong to and which row as well? This is especially important as tables become larger and hold more information. Both W3C and WebAIM suggest ensuring that your tables have column and row headers that identify what each cell will be referencing (W3C, 2019; WebAIM, 2017). Many screen-readers will read the column and row headers before the data in the cell, helping users to know what information they’re receiving. For example, consider this table mentioning sales by individual:

Left Blank	\$2,000	\$3,000
Name	Mike	Sarah

Left Blank	\$2,000	\$3,000
Location	Denver	Los Angeles

When a screen-reader reaches the cell that crosses the two sections "Name" and "\$2000" it would read "column: \$2,000, row: name, Mike". Continuing to the next row of "\$3,000", the screen reader would read "column: \$3,000, row: name, Sarah". As you can see by the table as well, it can be a good idea to make the column and row headers bold. Also, as you can see by the table, WebAIM recommends never leaving cells in a table header empty. (WebAIM, 2017). So, what should you do if you need to leave a cell empty, or if it makes more sense for the cell to be empty rather than filled? Michigan State University recommends never leaving cells blank, and either putting "n/a" or "left blank" to indicate to screen-readers that the cell is left blank intentionally (Michigan State University, n.d.).

Another important aspect to consider with tables is a table summary. The University of Minnesota discusses that table summaries can appear as context surrounding the table or as alternative text (University of Minnesota, 2022). Just as we discussed alternative text for images earlier, tables can also have alternative text attached to them. Also, as we discussed with alt text for images, this alt text should be concise and should accurately describe what the table is meant to convey (*Accessibility: image alt text best practices*, 2021). However, Michigan State University advises against using alt text for tables except when necessary to assist assistive technology users, and instead recommends using context descriptions instead of or in

tandem with alt text (Michigan State University, n.d.). Context descriptions in this case would be describing the purpose of the table in the surrounding text of the table (Michigan State University, n.d.).

Lists

The final important consideration to make when creating an accessible document is lists. Lists can be a useful way to present connected sets of information to users and can be useful for providing steps or instructions. There are a couple different styles of lists you can choose to use to present the information you need the user to receive. However, it's important to determine what kinds of lists you need for different situations, and when each style of list works best for the content you're presenting.

The first style of list you'll use is the unordered list (W3C, 2017). These lists often appear as bulleted lists and are often used to present large sets of grouped items. An example of this style of list could be a list outlining ice cream flavors:

- *Chocolate*
- *Vanilla*
- *Strawberry*
- *Cookies and Cream*

The importance of an unordered list and the reason you would use this list style is that these items do not need to be in any specific order (W3C, 2017). For our example, it's not important if vanilla comes before chocolate, or if strawberry is the first item in the list. What we are listing is simply a group of ice cream flavors, we are only using the list to show the group in a simpler way.

The second style of list you'll use is the ordered list (W3C, 2017). In contrast to the unordered lists, these lists do show levels of importance, and it's important for the items in the list to be in the order that they are in (W3C, 2017). Using our previous

ice cream example, we can show an ordered list that lists my favorite ice cream flavors:

- 1. Cookies and Cream*
- 2. Vanilla*
- 3. Strawberry*
- 4. Chocolate*

As we can see from this list in comparison to our unordered list, our list items are numbered and appear in a specific order that is important (W3C, 2017). If we moved cookies and cream to be the last list item, and strawberry to be the first, then the list wouldn't accurately reflect what we're listing. This can be easier seen when showing steps or instructions, such as in a recipe. Imagine you created a list for making a grilled cheese sandwich, where the steps were:

- 1. Butter your bread*
- 2. Cook Bread in your pan until the bread is golden brown on both sides*
- 3. Turn the burner to medium heat*
- 4. Place cheese between bread slices*
- 5. Butter the pan*

As you can see, these steps are confusing and out of order, and would result in quite the mess of a grilled cheese sandwich. While this example seems unrealistic, this shows clearly and simply the importance of the distinction between ordered and unordered lists. If the order of the list items is important, be sure to use an ordered list, and if the order is not important feel free to use an unordered list (W3C, 2017).

Finally, the University of Colorado Boulder recommends formatting your lists correctly in the text editor you use (University of Colorado Boulder, 2021). This will identify to screen-readers that the content is designed to be a list. This can be important for screen-reader users if they're tabbing through a document, they may miss an important list if it's not formatted

correctly in the document. This also alerts screen-reader users as they're going through a document that they are about to see a list, and what kind of list they'll encounter. For example, most screen-readers will read "ordered list, list item 1" when they enter an ordered list, or conversely "unordered list, first list item" when they enter an unordered list (W3C, 2017).

Conclusion

As you can see from the content presented, there is a lot to consider when it comes to creating Universally Designed and accessible documents. However, with practice and dedication all these aspects become second nature when creating documents and materials. As you gain experience in creating documents using these mindsets, you'll start to find that it becomes easier to make documents as you include these practices, and that you don't even think about whether your lists need to be ordered or unordered, or your heading levels are correct, because you've accounted for these considerations as you've gone. You'll also find that your range of students (and the ranges of students to those you teach these practices to) may open, and that students with varying ability levels interact with your materials more fully and complete your assignments more accurately. Above all, by including these practices, you'll find that you're making an impact not only in the lives of students but your fellow instructors as well, as you work to create a more inclusive environment and provide more opportunities for success for anyone who wishes to achieve.

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