CHAPTER 10

Designing Digital Content for All Learners

By the end of this chapter, you will:

- Know the rationale and legal obligations behind accessible digital content
- Understand the nine elements of accessible digital content

ISTE Standards

This chapter addresses several ISTE Standards for Educators.

2. Leader

Educators seek out opportunities for leadership to support student empowerment and success and to improve teaching and learning. Educators:

b. Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.

c. Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.

5. Designer

Educators design authentic, learner-driven activities and environments that recognize and accommodate learner variability. Educators:

c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.

What Is Accessibility and Why Is It Important?

As we design digital content for our classroom, we also need to make sure those materials are accessible to all students. According to the organization Be Accessible, "accessibility is all about our ability to engage with, use, participate in, and belong to the world around us" (n.d.). At the heart of it, accessibility is about equity of access and ensuring that all students have a level playing field from the start. We do this by ensuring that all students can interact and engage with our digital content from the beginning.

Not only is it our obligation as teachers to create accessible digital content, it is also the law. The Americans with Disabilities Act and Section 504 of the Rehabilitation Act both give us guidelines about accessibility specifically to meet the needs of students with disabilities. These federal laws state that no student should be denied access to any learning activity. To ensure that students are not discriminated against because of their disability,

the law says that content should be readily accessible. Essentially, the laws state that students with disabilities should have equal access to the same opportunities as all students.

Accessibility versus Accommodations

When we make our digital content *accessible*, we are taking a proactive approach. Accessible content is content that most students can engage with immediately, regardless of their unique needs or abilities. On the other hand, *accommodations* involve the changes to content and assessment that we make during instruction that is unique to a student and cannot be addressed proactively.

Designing our digital content to be accessible does not eliminate the need for accommodations for our learners. However, if we only ever rely on accommodations, we create roadblocks and obstacles for students that prevent them from having equitable opportunities for success. We never know when a student with a disability of some kind will be placed in our classes. Taking that a step further, some of our students may have undiagnosed or undisclosed disabilities that we may not know about for some time (or ever). Those students deserve immediate access to the learning materials from day one. If we rely solely on accommodations, these students cannot begin their work immediately, because they have to wait on the adults to update the content so they can access it. This puts students at a disadvantage when they do not have equal access from the start.

When we design with accessibility in mind, we are prepared for any student that walks in our door. Additionally, while we rarely teach the same lesson year in and year out, it is not unreasonable to think you may want to reuse and remix the digital content you design. This is another reason to design for all students now, regardless of who you have in the room this year, so you can be prepared for future classes no matter what.

Design for the Nine

Designing accessible content certainly takes a bit more time than designing without accessibility in mind. However, it is a lot easier to design proactively and accessibly than to reactively "fix" content when a student that cannot engage with your content as-is joins your class. As you read this chapter, consider the differences in workload that it would take to retroactively fix issues with inaccessible design versus designing with all students in mind from the beginning.

While you create digital materials for your students, you should consider the nine elements of accessible content:

- Text formatting
- PDF readability
- Use of color
- Animations and visual effects
- Hyperlinks
- Images
- Math equations
- Keyboard navigation
- Video captions and transcripts

Let's take a look at each element in depth.

Text Formatting

Text is often a dominant aspect of many digital lessons. Inaccessible text can quickly compromise learning if steps are not taken to ensure all students can access this content.

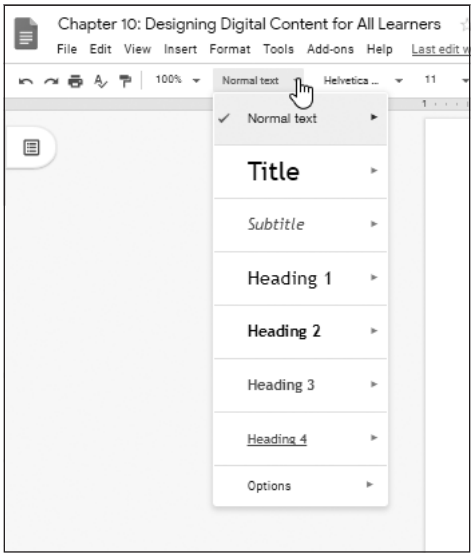
Headings and Styles

Headings provide visual cues to navigate a text. As you are reading this book, for example, you probably are using the headings and subheadings. If you go back in the book to review or reread something you read, you are likely to use them to search for the particular section you are looking for. As you read a website, you may not read the entire page if you are looking for one piece of information. Headings and subheadings are handy for skipping through a text to find specific information.

However, a person who is using a screen-reader on a website or digital text because they have low vision or blindness cannot see that visual cue. They rely on technology to help them navigate the page. It is important to make sure our headings and subheadings can be identified by a screen-reader so a person with impaired vision can navigate the text efficiently.

The problem with this is we cannot simply create headings by making the words bold or larger. Screen-readers do not distinguish normal text from bold or italic text. They don't let the reader know that some text is larger than others. They just read the words. So, in this instance, a student who wanted to go back to the text to find some information for an assessment, for example, would have to listen to the whole text again. They would not have the ability to quickly identify headings to pinpoint specific sections of text.

The simplest way to make headings and subheadings accessible is by applying *styles* to text, which you can do from the Styles menu (sometimes called Paragraph Styles) in your word processor (Figure 10.1). Instead of making a heading stand out manually by changing the font size and formatting, select the style that corresponds to the heading's place in your document's hierarchy (Title, Subtitle, Heading 1, Heading 2, etc.).



10.1 The Styles menu in Google Docs

If you are working in a text box inside a learning management system that does not have style options to structure your heading hierarchy, all is not lost. Often, you can type and style the information correctly in Microsoft Word or Google Docs and paste that text into a text box while still retaining the heading code. One way to test this is to check the source code of the text box after you copy the information over. When headings are styled correctly, tags are added around them (<h1> and </h1> surrounding Heading 1 text, for example). If you see these tags, you know the heading is accessible.

Font Choices

It is important to choose fonts that are easy to read. Making your font choices accessible improves legibility for all users, not just those with vision impairment. Stick with simple fonts that are widely available on all devices. In general, texts with one font (two at most) are the easiest to read. Some fonts were actually designed specifically for the web, such as Verdana,

Tahoma, Trebuchet MS, and Georgia, while others, such as script and novelty fonts, make on-screen reading extremely difficult. Avoid the latter, and also avoid writing sentences in all capital letters. Not only does writing in capitals look like you're yelling, but it is harder to read text written this way.

WEBAIM

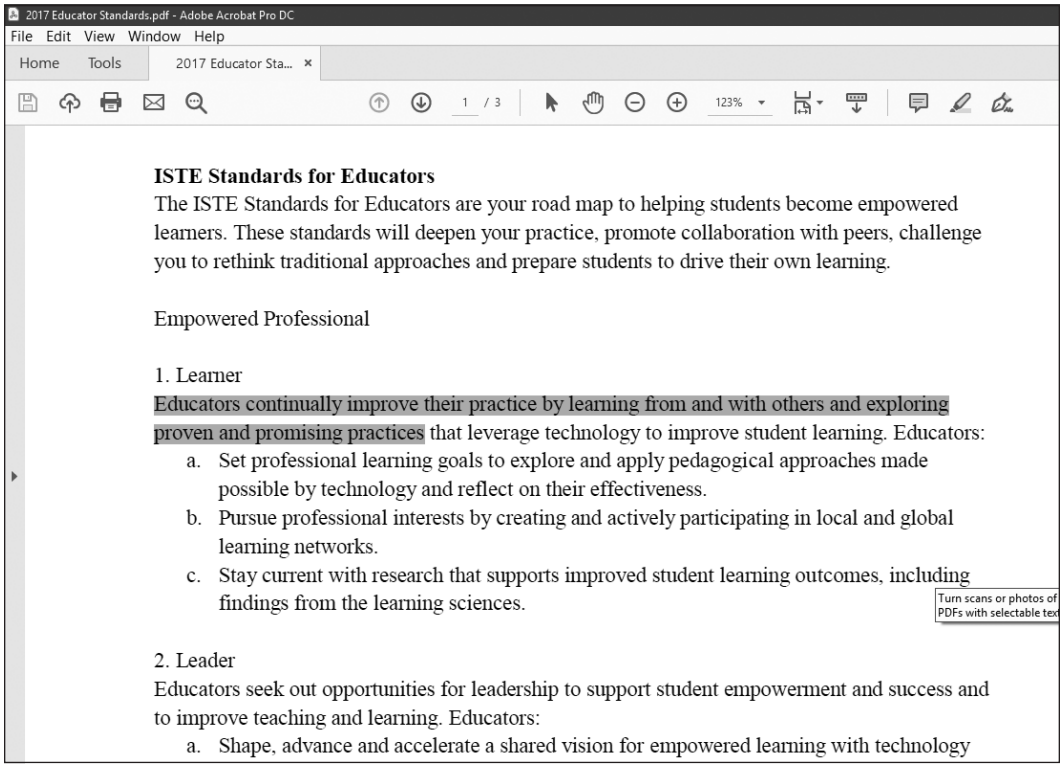
If you would like more information about font choices and accessibility, I recommend checking out the WebAIM (Web Accessibility in Mind) resources available at **webaim.org/techniques/fonts**. WebAIM is a non-profit organization that provides expertise, guidelines, and tools for designing accessible digital content.

PDF Readability

Students using screen-readers must also be able to navigate PDF files, and not all PDFs are created equal. Consider a PDF file of a magazine article, for instance. It could either contain scanned images of each page of text, essentially static "pictures" of the pages, or a searchable copy of the article's text. A screen-reader can read a PDF only if it contains searchable text, not a static image of a document.

So how do you know if a PDF contains searchable text and, therefore, is accessible? Try a quick test: Open the PDF and try to highlight the text. If you can highlight individual words, the PDF is likely accessible (Figure 10.2). Another easy test is to use the Find function to search for a word that you see on the screen. If you can find the word using the Find function, then a screen-reader can read those words, too.

PDF readability is a great example of how proactive accessible design is much easier than trying to fix issues later. Imagine you are designing a digital lesson and want to use a particular PDF. If you find that it is inaccessible, you simply don't use it and use an alternative resource instead. If you use an inaccessible PDF in a digital lesson and try to make the lesson accessible later, that is a bigger problem, especially if you have designed assessments that go along with that document. In this instance, you have to either find that exact document in an accessible format, redesign the lesson with a new resource, re-type the information from the PDF, or find another way to convert the PDF to accessible form (see the "Microsoft Office Lens" sidebar). Taking that extra step now could help save you some time and frustration in the future.



10.2 Because I can highlight individual words and sentences in this PDF of the ISTE Standards for Educators, I know this PDF is accessible.

Use of Color

The way you use color in your digital content can quickly make your online lessons inaccessible if you're not careful. When you design, always consider the contrast between the background and the text, as well as how you use color to indicate action.

Color Contrast

When you add color to your online lessons, be sure to maintain a high contrast between the background and foreground colors you choose. As a general rule, any time students are reading content that is more than a few words, you should use a black font on a white

Microsoft Office Lens

MICROSOFT OFFICE LENS

Microsoft offers a great free tool to help make PDFs accessible. Microsoft Office Lens scans images or PDFs with text, then uses the Microsoft Immersive Reader tool to make the text readable and editable, even if the original PDF is not accessible. For more information, see **bit.ly/officelens**.

background. If you are creating slides or an image with just a few words on it, colored text is okay if there is still a high contrast present, but most text in your digital content should be black. Some students with a vision impairment may benefit from a black background with white text because of the glare a white background produces. This is a case when an accommodation for those students would be the best solution.

WebAIM Contrast Checker

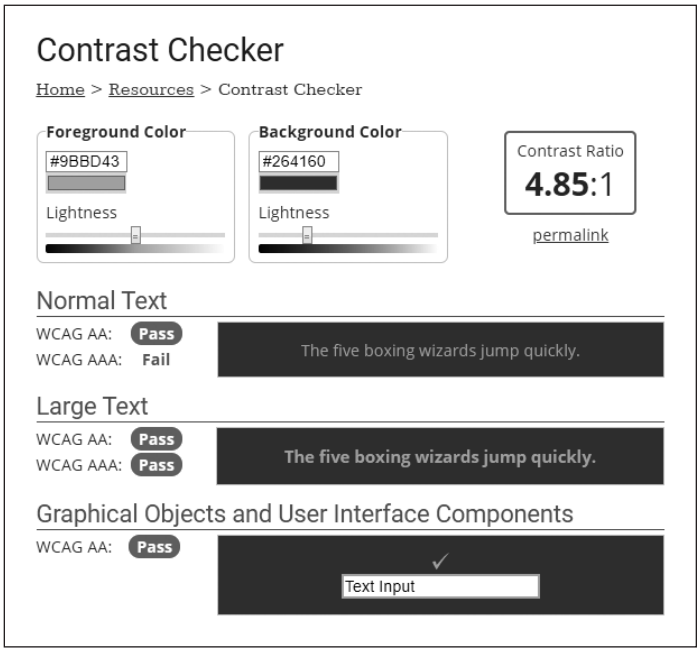
CONTRAST CHECKER

One of the resources on the WebAIM website is the Contrast Checker, which can be a lifesaver when you're choosing colors for presentations, posters, images, and the like. It checks the background color and the foreground color for accessibility and lets you know if your color combinations have a high enough contrast. You can try it at **webaim.org/resources/contrastchecker**.

EYE DROPPER

To specify a color, you can enter its hexadecimal code in the text box or click the colored box under it to select a color from the color picker. With the help of a third-party eyedropper tool, you can also sample a color from an image, website, or document (I use the Eye Dropper Chrome extension from **bit.ly/eyedropext**). After you enter your colors, Contrast Checker shows you a sample of the combination for normal text and large text, as well as information on whether the combination passes the Web Content Accessibility Guidelines (WCAG) levels of conformance.

For example, Figure 10.3 shows the Contrast Checker in action, evaluating my green foreground color for text and navy blue background color. Let me explain what the results mean. The WCAG have three levels of conformance: A, AA, and AAA. Level A is the minimum legal compliance for accessibility, and AAA is the highest level of compliance. (The WCAG contain standards for all of the nine elements in this chapter, plus others.) My green and navy blue combination conforms for both levels for large text but not the AAA level for normal text.

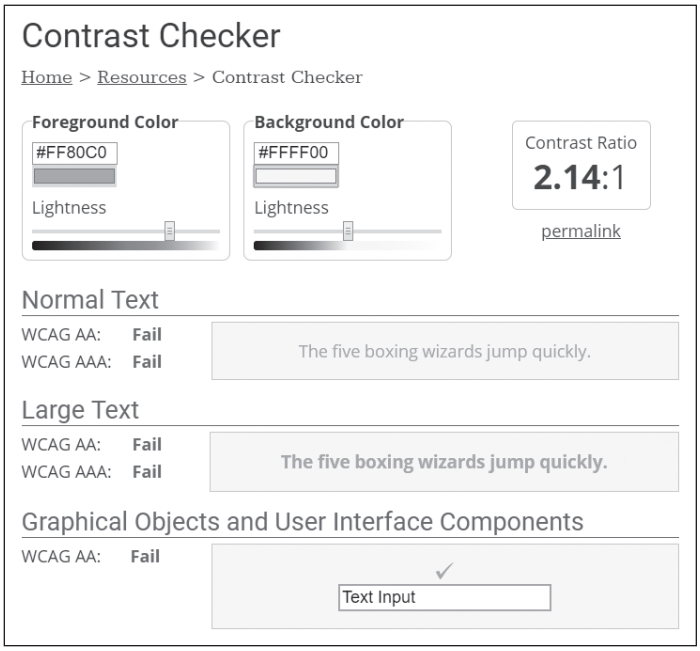


10.3 The WebAIM Contrast Checker tests a combination of two specified colors for conformance with the Web Content Accessibility Guidelines. View the full color image at bit.ly/webaimcc1.

Video accessibility, which we will discuss in detail later, is a great example to showcase how the three WCAG levels build on each other. For a video to be compliant at level A of the guidelines, it must have accurate closed captions. Level AA states that even live video needs to have accurate closed captions and recommends including a transcript of all audio and video. Level AAA includes all of the above plus an additional video of the content being signed in American Sign Language.

It may not always be possible to reach Level AAA of the Web Content Accessibility Guidelines for all of your digital content, and that is okay. When it comes to color usage, though, I generally try to reach the highest level because it is not that difficult to do. The only difference between Level A and Level AAA is a higher contrast between colors.

While Figure 10.3 demonstrates a moderately successful combination that passes for normal text at Level AA and for large text at Level AAA, Figure 10.4 demonstrates what it looks like when the color contrast is too low and fails the checker. Even if you have perfect vision, those colors are hard to look at when together. This is another example of how designing for accessibility benefits everyone.



10.4 This pink and yellow combination does not have a high enough contrast to be accessible at any WCAG level. View the full color image at bit.ly/webaimcc2.

Try It with Students

Why not show the Contrast Checker to students, too? If you have ever had students design anything online, I can almost guarantee you have experienced inaccessible color combinations. They are definitely not fun to grade either! Have your students bookmark the WebAIM Contrast Checker on their devices and use it before submitting any work they design. It will be easier for you to view later, but more importantly, it will teach students valuable lessons about accessibility. It is unlikely that students will go through life without creating content for others. It is a valuable skill to learn at any age that we must design for *all* users in mind, not just some.

I have also used this tool with young students. They do not have to understand what WCAG stands for or even about color codes. If they can select colors from a color picker, they can see that green means their colors work together and red means they are too hard to read when paired together. Even our youngest learners can begin to learn about accessibility.

Animations and Visual Effects

Animations and visual effects can liven up your lessons or turn them into an accessibility nightmare.

Flashing Content

Certain animations and visual effects can be detrimental for people with seizure disorders, and because of this the Web Content Accessibility Guidelines state that page content should not contain objects that flash more than three times per second. Personally, instead of trying to count flashes per second, I tend to be a bit more conservative with flashing or blinking content. I avoid it altogether, just to be safe. Ultimately, flashing or blinking on a page is likely to be a distraction from the content we are delivering to students anyway.

As you are directing students to websites, be sure to:

- Remove any flashing or blinking animations.
- Change transitions in presentations to slow, simple animations.
- Avoid using websites with flashing content or ads.

ADOBE ACROBAT DC

What if because you can't find an equivalent resource to offer students, you need to direct them to a web page with flashing content or advertisements? Download the page as a PDF to eliminate the flashing while preserving the content students need. Several Chrome extensions enable you to convert a web page to a PDF, such as Adobe Acrobat DC (**bit.ly/adobeext**). Many of these extensions allow you to delete aspects of the web page from the PDF, like unwanted ads, for example. When doing so, be sure not to delete information about the website and authors so as not to create confusion about who the content belongs to.

RSS Feeds

RSS feeds on websites are another source of movement and one students must be able to stop. RSS feeds are embedded widgets that can show activity streams on Twitter, Facebook, blogs, and so on; when new posts are made, the feed scrolls through new content. You may have one on your school or classroom website. When sending students to a website that has an RSS feed, make sure all widgets have a pause option. All users should have the option to pause the automatic movement from those feeds. If that is not available, you may want to find a different resource or turn the website into a PDF as described above.

Hyperlinks

You can even create your hyperlinks in a way to be accessible for all users. To do so, be sure the hyperlinked text always describes the contents of the link. Someone using a screen-reader should be able to know exactly what to expect when clicking on a link without reading any contextual information around the link. For that reason, hyperlinking phrases such as *click here* or *this link* are inaccessible and should be avoided. Figure 10.5 shows examples of correct and incorrect ways to hyperlink. The hyperlink should be able to stand alone with no content and the user would still know what they are clicking on.

10.5 One accessible hyperlink and two examples of incorrectly hyperlinked text

For a similar reason, it is rarely appropriate to leave a URL as is without hyperlinking to a phrase. Imagine a screen-reader trying to read that third link in Figure 10.5! You will want to avoid using URLs by themselves because a screen-reader will read each individual character listed. That could get really long depending on the URL.

Images

Students who are unable to see the screen have no way of knowing what an image shows unless a screen-reader "reads" it to them. If we are effectively using images in our digital designs, the visual media we choose should have instructional value. For this reason, we have to make these images readable so all students can benefit from them, even if they cannot see them on the screen.

Alt Tags

Any time you use an image, you need to add what are called *alt tags* or *alternative text* to it. Alt tags are descriptive pieces of text that are not visible on the screen but are used by a screen-reader. Students viewing the page without a screen-reader will not see this text. When students access the page with a screen-reader, however, it will read the text listed in the alt tag, describing the image for students.

Although the process for adding an alt tag varies depending on the tool you are using, the tools you need are generally found where you adjust formatting options for the image. Sometimes, you can add alt tags when you initially add or upload an image; learning management systems often offer this option. In Google Slides and Docs, though, you can just right-click an image and select Alt Text from the resulting context menu.

No matter what steps your software requires, the need for descriptive alt tags remains the same. It is worth the investment of time to find how you can add alternative text to ensure that the images you use are accessible to all students.

Longer Image Descriptions

Alt tags are sufficient for short descriptions, but some images may require a longer description than normal. For instance, charts, graphs, and infographics carry a ton of instructional content. For these, you are better off supplying the information in an online collaborative document and adding a descriptive hyperlink to the text version below the image. Essentially you would be creating a transcript of the image.

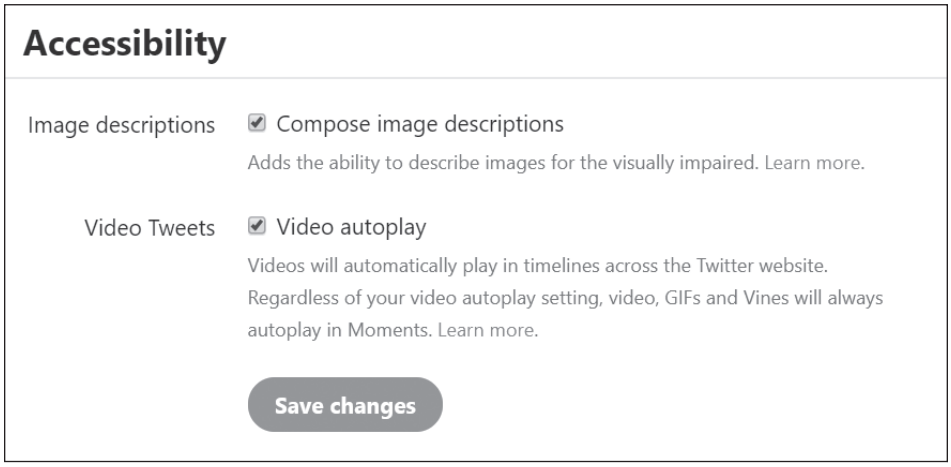
Please do not let this deter you from using infographics, charts, or tables in your digital content. These types of visual media can be great ways to convey information and make excellent additions to online lessons. As a matter of fact, if you are designing your own

Accessibility on Twitter

Did you know accessibility matters even on social media?

If you are on Twitter or another social media platform that utilizes hashtags, write those hashtags in *camel case* so they can be easily read by a screen-reader. Like humps on a camel, each word of the hashtag should start with a capital letter. A screen-reader would then read #LikeThis as "hashtag like this." Conversely, if a screen-reader encountered the hashtag #notlikethis it would not know where each word began and would have to read each individual letter. Avoid hashtags that are all lowercase.

Do, on the other hand, turn on image descriptions or alt tags for the images you share with your tweets. To turn this feature on (it's off by default), first navigate to Settings and Privacy on Twitter. Select Accessibility and turn on Compose Image Descriptions (Figure 10.6). Now when you tweet, you will see an additional option to add an alt tag to the images you post.



10.6 Twitter's Accessibility settings

When you know better, you tweet better.

infographics or images, it can be helpful to plan them out in an online collaborative document. If you create a storyboard or rough plan of the graphic before you begin designing, that document can serve as a transcript of the image later. The planning will help you design efficiently, while serving a dual purpose.

Math Equations

Math and science formulas and equations must be readable by a screen-reader. If an equation is displayed as an image, though, it may not have the proper alt tag to be recognized by a screen-reader. There are three options when creating accessible equations or formulas.

- If equations are saved as an image, add an alt tag to each image with the math equations and symbols typed out in words. Imagine how a screen-reader without an understanding of math might read the formula.
- Use an equation editor tool that has the MathML designation. MathML is an accessible equation writing language.
- Use Microsoft Word documents for worksheets with equations instead of PDFs. Word's equation editor is accessible. Developing equations directly within your learning management system is also a good idea, assuming you can verify that it uses an accessible equation editor within the platform.

Just like with PDFs, if you can highlight individual terms in an equation in your digital content, the equation is likely accessible. On the other hand, if highlighting the equation produces a box around the entire formula, the equation is probably an image that would require an alt tag to be accessible.

Keyboard Navigation

If a student struggles with fine motor movement, using a mouse or trackpad to navigate a website can be next to impossible. For a website or a piece of digital content to be accessible, a person must be able to successfully navigate the page using only the keyboard.

Accessibility Checkers

Several tools are available to help you check your documents and websites for accessibility. You may not need to use a checker on a document that you have designed, as you will know if you added alt tags, used proper headings, selected accessible colors, and so on. However, I do like to use these, especially for content that is shared from other teachers. Before using a document or digital lesson that was designed by someone else, I run it through one of these accessibility checkers to see if there are any issues I need to correct before delivering the material to students:

GRACKLE DOCS

Grackle Docs. Grackle Docs (**grackledocs.com**) is a G Suite add-on that can be used in Google Docs, Slides, or Sheets. Run this add-on while you have the document open to flag any accessibility issues with the text, colors, links, or images. For a short tutorial, check out the video at **bit.ly/grackledocs**.

GRACKLE DOCS TUTORIAL

Microsoft Accessibility Checker. When working with Microsoft products, you can use their built-in accessibility checker. Simply select the Review tab and then choose Check Accessibility to check for accessibility errors and receive recommendations for how to correct them. You can also keep the accessibility checker on while you work, and it will keep you updated about errors in real time.

WAVE

WAVE EXTENSION

WAVE Web Accessibility Evaluation Tools. WebAIM offers a group of accessibility checkers called WAVE (**wave.webaim.org**). You can check the accessibility of a link by entering it on the WAVE page of the WebAIM website or install an extension in Chrome or Firefox (**wave.webaim.org/extension**).

To test a website's keyboard navigation accessibility, try:

- Pressing the Tab key to navigate from button to button on a site
- Pressing Shift+Tab to go back to the previous button or link
- Pressing the Spacebar or Enter key while a link is selected to activate that link or button

Fortunately, if you are creating documents in Microsoft Office or G-Suite, you can rest assured that those platforms have accessible navigation. Most popular learning management systems also have platforms that are accessible without the use of a mouse. Navigation accessibility becomes more of a question when you direct students to outside websites. However, it does not take much time at all to check a site before providing the link to students.

Video Captions and Transcripts

As mentioned previously, to be legally compliant and meet Level A requirements under the Web Content Accessibility Guidelines, all pre-recorded videos must have accurate subtitles or a transcript available. These can be manually added or automatically generated, as long as they are accurate. Captioning or transcribing videos will most likely be your most time-consuming task when making sure your digital materials are accessible before delivering them to students.

Although YouTube can automatically generate captions, remember that voice-to-text automation is not perfect. If you are using a YouTube video, check all of the captions for accuracy.

If you upload your own video to YouTube, you can edit the automated captions or create the subtitles yourself. Editing the automatically generated subtitles and just correcting the mistakes is a fairly efficient way to create accurate closed captions. Keep in mind, though, that you have no control over the subtitles in someone else's video. If you are using a video platform where closed captioning is not available or if you are using someone else's video with missing or inaccurate subtitles, you can type a transcript of the video in an online collaborative document and link it below the video.

We discussed in Chapter 8 how creating your own videos can be helpful for your learners as they engage with the digital lessons you develop. Doing this can also save you the time and hassle of transcribing someone else's video. Not only can you edit automatically generated

Google Closed Captioning Tools and Strategies

In addition to the tools built into YouTube, you can also use Google tools to help with various closed-caption and subtitle tasks:

- **Voice to Text in Google Docs.** The Voice Typing tool in Google Docs enables you to create a transcript of a video when you use it strategically. From the Tools menu, choose Voice Typing to turn on the voice-to-text feature, and then play the video you need a transcript of. Google Docs will transcribe what it hears from the video into a document. You can then edit the document to correct any inaccuracies. Using this feature allows you to re-create YouTube's automatically generated and editable closed captions.
- **Real-Time Closed Captioning in Google Slides.** Google Slides now has automated closed captioning that you can use in real time. When you are in Present mode, click the CC option at the bottom and choose your font size. This is great for presentations or lectures using Slides and is *surprisingly accurate*.
- **Live Captions in Google Meet.** Google Meet is Google's videoconferencing tool, and it now supports live captions for online meetings. You can use this if you are meeting with a student or a guest speaker and need to provide subtitles of the conversation.

subtitles with ease, you can also plan ahead to lighten the load. When creating your own video, you could write the transcript before recording. Doing this will help you stay on topic and keep the video concise. You can also then use that script as a linkable transcript after creating the video.

Know Better, Do Better

After reading this chapter, you might be feeling overwhelmed. I know I felt that way when I learned about accessibility. My first thoughts went to all of the content I had created before that I knew was inaccessible. I wanted to immediately fix everything I had ever done, and that feeling caused stress and anxiety. How was I ever going to fix all of that content?

Allow yourself some grace. You may never be able to change everything you have ever created for students. I recommend focusing your attention on the future and the materials you create and curate moving forward.

10.7 The words of poet Dr. Maya Angelou apply to your work with accessible digital content. When we know better, we do better.

Chapter 10 Key Points

In this section, the important takeaways from the chapter are paired with the ISTE Standards for Educators that inform them.

- Accessible content is content that almost all students can engage with immediately, regardless of their unique needs or abilities. On the other hand, accommodations involve the changes to content and assessment that we make during instruction that are unique to a student and cannot be addressed proactively. (Educator 2b)
- It is our responsibility as educators to ensure that the content we deliver to students is accessible, both because of a legal obligation and because it is what is best for our students. (Educator 2b, 2c)
- The nine elements of accessibility to consider for your digital content are: text formatting, PDF readability, color, animations and visual effects, hyperlinks, images, math equations, keyboard navigation, and video captions and transcripts. (Educator 2b, 5c)
- Although you may not have the time to go back and fix all of the digital content you have created up until this point, you can focus on making sure the digital materials you create moving forward are all accessible. (Educator 2b, 2c, 5c)

Reflection

After reading Chapter 10, take some time to consider how its ideas apply within your context using the questions below.

- How accessible are your color combinations? Try out the WebAIM Contrast Checker to test colors you have used in a recent presentation or test the colors of some of your favorite Microsoft PowerPoint or Google Slides themes.
- What are some examples of accessible and inaccessible hyperlinks you've added to your lessons? How would you change them? What examples can you find online?
- How accessible is the navigation for your favorite student websites or even your classroom website? Can you move through the page without the use of a mouse or trackpad?
- What aspects of accessibility could you reasonably teach students about as they create in the classroom?

Share your reflections and thoughts online using the hashtag #PerfectBlendBook.