JIMALEE SOWELL
United States

Making Learning Inclusive in Digital Learning Environments

I have a Disability yes that's true, but all that really means is I may have to take a slightly different path than you.

–Robert M. Hensel (disability activist, poet, and athlete)

Disability theorist Lennard Davis claims that "disability is an unavoidable outcome of living" (1995, 8). Jay Dolmage, who has written widely on disability rights, points out, "There is no perfect body or mind. And there is no normal body or mind" (2008, 17). In other words, no one is perfectly "able." Everyone faces limitations, and some might face more-severe limitations at different times in life through age, illness, or other unexpected occurrences (Davis 2018). Having a disability, however, should not preclude anyone from learning. As a result of several recent international movements, schools in nations around the world now provide inclusive education, which means that students with disabilities have access to the common curriculum in the general education classroom (Bryant, Bryant, and Smith 2019; Mastropieri and Scruggs 2017).

English language instructors need to provide equitable instruction to all learners in inclusive settings. Online learning has made it possible for many students with different kinds of disabilities to access classes and learning materials that were once out of reach or difficult to obtain (Burgstahler 2012). However, whenever teachers do not adopt necessary measures to accommodate as widely as possible in digital spaces, they sometimes unknowingly create barriers for students with disabilities (Anderson 2020; Burgstahler 2020). It is our responsibility as educators to understand the actions we need to take to ensure that we accommodate our learners as widely as possible in digital learning environments. The purpose of this article is to present the main principles of accessibility for online learning. The first part of the article defines disability. The next section focuses on how to apply the framework of universal design for learning (UDL) to the online teaching context. The final section explains how to create or modify learning materials so that they are accessible educational materials (AEMs).

DEFINING DISABILITY

Defining disability is difficult. Historically, there have been a number of competing definitions (Davis 2018), some of which have been devised for medical purposes and some for legal purposes. For this article, I use Murray, Schultz, and Cabrera's (2016) definition because it includes physical, mental, and psychological disabilities, all of which can impact a student's performance on academic tasks:

English language instructors need to provide equitable instruction to all learners in inclusive settings.

> The term *disability* refers to a number of variations in ability involving physical, sensory, learning, medical, and psychological capacities. Physical disabilities can exist from birth or be acquired later in life and include things like amputation and spina bifida. Sensory disabilities are conditions affecting vision and hearing. Learning disabilities, like dyslexia, attention deficit disorder, and hyperactivity disorder, affect one's collection, processing, and communication of information. Medical disabilities, like epilepsy and diabetes, impact one or more systems within the body. Disabilities of a psychological nature include depression, bipolar disorder, and post-traumatic stress disorder. (116)

ONLINE LEARNING IS NOW UBIQUITOUS

Online teaching was once considered a skill that only teachers with specialized training could carry out. While it still might be true that online learning can be improved through training and access to certain types of equipment, with the current state of technology and general access to it, most teachers can now create and carry out online classes fairly easily. Even in face-to-face classes, digital technologies are often a part of the course (Hashey and Stahl 2014). Students might communicate with instructors and other students via a learning management system (LMS); they might communicate about a class project via social media; and they might submit assignments through an LMS or email. The recent widespread switch to online education has launched many educators headlong into learning how to successfully carry out online instruction. While we are acquiring or updating skills for teaching online, we should give equal attention to understanding how to accommodate students with disabilities in a digital learning environment. When we do not make our classes accommodating to all students, some students are left behind through no fault of their own (Anderson 2020). Whenever we work to create inclusive learning environments, we provide support for all students, with or without disabilities.

UNIVERSAL DESIGN FOR LEARNING (UDL) AS A FRAMEWORK FOR ONLINE LEARNING ENVIRONMENTS

UDL is an educational framework based on the architectural concept of universal design, in which spaces are built to be as accessible as possible (Mt. SAC Library 2022). UDL uses a variety of methods and techniques to provide equal access to learning for all students, not just those with disabilities (Coombs 2010; Gilbert 2019; Rapp 2014; Scott and Edwards 2019). (For a discussion of UDL principles in the English language classroom along with practical ideas for helping students with learning disabilities, see Sowell and Sugisaki 2021.) Online learning is one of the platforms that benefits from UDL (Coombs 2010) because it offers more options for providing accommodations than traditional print-based learning contexts. The UDL framework has three main principles: (1) provide multiple means of engagement, (2) provide multiple means of representation, and (3) provide multiple means of action and expression (Rose and Meyer 2002). This section explains how these principles of UDL are applied to online learning.

Provide Multiple Means of Engagement

Learners respond differently to learning tasks and situations (Rapp 2014). To address the diversity in your class, use different methods of engagement in each lesson and throughout the course. This could include different types of interactional patterns (e.g., individual work, pair work, group work, whole-class work) and different types of activities and assignments. To keep learners engaged, make sure that no one

Online Technology Tools to Engage Learners
Google Classroom / Canvas / Schoology: Assign work, post class announcements, collect student work, and post grades.
Kahoot!: Quiz students on recently learned material.
Quizlet: Make interactive flashcards.
Flipgrid: Share videos on various topics.
Google Docs: Give learners a platform for written collaboration.
Socrative: Provide students a platform for teamwork, collaboration, and instant feedback.
YouTube: Access and post educational videos.
Zoom: Video-conference with your learners.
Jamboard: Collaborate on a shared whiteboard space.
Nearpod: Create polls and quizzes, solicit responses to open-ended questions, and access pre-created lessons.
Padlet: Communicate via an online digital bulletin board for purposes such as group discussions, collaborative brainstorming, and problem-solving activities.

Figure 1. Technology tools for engaging learners online

activity lasts too long. Scott and Edwards (2019) recommend changing activities or methods every ten minutes. The online learning environment provides multiple ways to make learning interesting through media and technology tools (Coombs 2010; National Center on Accessible Educational Materials 2022c). (See Figure 1 for some technology tools to use to engage students.) It is important not to use technology just for the sake of attracting attention, however, but to use it because it has a learning purpose that you are clear about (Coombs 2010; Kolb 2017; Nilson and Goodson 2018). For instance, don't show a video just because it's fun, but because it helps achieve a learning goal.

While synchronous activities (such as video conferencing) provide students with opportunities to connect with one another in an immediate way, live chats can cause difficulties for students who cannot read and type chat entries quickly (Simpson 2013). Asynchronous activities, such as blogs, Facebook entries, and online discussion boards, can be easier to manage (Simpson 2013). Ultimately, to meet the needs and interests of all students, have a blend of synchronous and asynchronous activities and record synchronous classes so that students who would like to review the content after the session will be able to do so. There is no single activity that will engage all learners equally; however, by using multiple methods of engagement, you can meet the needs of all learners.

Provide Multiple Means of Representation

Students engage with learning content in different ways (Rapp 2014). Some students might have preferences for how they consume content, and some students with disabilities might only be able to access learning content through certain modalities. While print text in materials like textbooks and worksheets is fixed, digital text can be manipulated by the user. Digital learning environments make it readily possible to provide content in a variety of means, through different methods of audio, video, and text (Bruce et al. 2013; Hashey and Stahl 2014; Pawan 2016). Key considerations underpinning these principles are as follows:

Whenever possible, give students options for how they will carry out an assignment. If, for example, the broad topic of your assignment is "ways to stay healthy," you could give students the option of making a podcast, filming a video, or creating a picture book.

- Provide the same information through different modalities (e.g., hearing, vision, touch). If content is visual, add accompanying audio and transcripts. If content is auditory, add accompanying visuals and transcripts (Burgstahler 2015; Dell, Dell, and Blackwell 2015).

- Provide content in forms that can be manipulated by the user (Coombs 2010).

To the degree possible, provide the following elements in flexible formats so that the features can be varied by the user:

- Colors used for emphasis

- Size of images and text

- Volume of speech or other sounds

- Speed of video and sound

- Layout of visuals (Coombs 2010).

Provide Multiple Means of Action and Expression

Learners express their knowledge and learning in different ways. For instance, some learners express themselves better through spoken language; others prefer written expression. Traditional methods of output in schools often privilege written production (for example, with tests, worksheets, and writing assignments) or in-class responses to teacher-led questions (Rapp 2014). While traditional output might suit some learners, it can create barriers for others. For example, learning and cognitive disabilities can result in difficulties in reading and writing (Coombs 2010). Providing students with multiple choices for output improves student learning and motivation (Rapp 2014). The world of the internet, with multiple ways to use text, video, and audio, can provide students with different ways to demonstrate their understanding (Bruce et al. 2013; Hashey and Stahl 2014). Whenever possible, give students options for how they will carry out an assignment. If, for example, the broad topic of your assignment is "ways to stay healthy," you could give students the option of making a podcast, filming a video, or creating a picture book.

ACCESSIBLE EDUCATIONAL MATERIALS (AEMs)

AEMs (also called accessible instructional materials) are learning materials and technologies designed to provide equitable access to learning for all learners. AEMs might be designed to be accessible from their inception, or they might be modified for accessibility (National Center on Accessible Educational Materials 2022c). Creating AEMs is fairly easy, though it takes a little extra effort (Clark 2002). Once making AEMs becomes routine, however, it is a skill that will seem as normal as any other aspect of preparing learning materials.

Creating Accessible Videos

Using videos is a great way to personalize online learning (Nilson and Goodson 2018). This section addresses ways to make sure your videos are accessible to all students.

Length of Videos

Video length is an important consideration. Dividing learning content into useful segments, or chunks, is considered an

effective learning technique for students with disabilities, especially those with learning disabilities (Coombs 2010). Research indicates that six minutes is the ideal length of time for an instructional video (Guo, Kim, and Rubin 2014). Instructional videos longer than ten minutes must either be very engaging or provide critical material (Nilson and Goodson 2018). If you need more than ten minutes, consider breaking your content into more than one instructional video. (Creating a script before you record helps you make a concise video.)

Adding Closed Captioning to Your Videos

Closed captioning makes your videos accessible to a wider audience. Captioning not only helps students who are deaf or hard-of-hearing, but also helps all students review and remember content (Linder 2016). Subtitles and closed captions have similarities, but they are different. Subtitles provide dialogue for the video and assume a hearing audience. Closed captioning provides dialogue and information about audio elements such a phone ringing or any other sound that is important to the meaning of the video content as well as speaker identification (National Center on Accessible Educational Materials 2022b). Most video-editing software provides a function for adding subtitles and captions during the editing process. With some sites, such as YouTube, you can easily add subtitles and closed captioning (National Center on Accessible Educational Materials 2022b). (Note that automatic subtitling and captioning might contain errors that you will need to edit.)

How to Add Subtitles or Closed Captions

1. Create a script or transcribe your video. Creating a script before you record a video makes adding subtitles and closed captions easier. If you don't have a script, you can make a transcription, which is a word-by-word written text of the video that you make after you have recorded it. Some companies, such as YouTube and Zoom, offer automatic transcription services. You can also find transcription services, some of which are free of charge, through a quick Google search.

2. Check your script or transcript against your video and correct any errors.

3. Input the subtitles or closed captions. Once your script or transcript is ready, you can add in the subtitles or closed captioning.

4. Review your video and subtitles or closed captions. Check your video and subtitles or closed captions to make sure they are accurate and, if necessary, make corrections.

5. Publish your video.

Additional Pointers for Making Good Videos

These easy-to-follow tips will improve the quality of your videos and, therefore, make them more-effective learning materials:

1. State the purpose of your video from the beginning and give your video a clear title (National Center on Accessible Educational Materials 2020).

2. Make your video interactive by periodically asking questions or giving students points to ponder (National Center on Accessible Educational Materials 2022b). This will help students reflect on and digest the content in the video.

3. Record in a place with good lighting and minimal noise or other distractions (National Center on Accessible Educational Materials 2020; Nilson and Goodson 2018).

4. If you are using a mobile device, use landscape mode to record and make sure your camera is steady (National Center on Accessible Educational Materials 2020). Alternatively, record through a platform such as Zoom so your camera will remain steady.

5. Make sure the audio and video components are in sync. Check to see that captions or subtitles are accurate and that they appear with accurate timing (Nilson and Goodson 2018). If you cannot add subtitles or captions, provide a transcript.

Creating Accessible Documents

Documents are an integral part of nearly every course. However, documents without modifications pose barriers to students with disabilities related to blindness, reading, and mobility. The National Center on Accessible Educational Materials (2022a) recommends the mnemonic SLIDE to keep key points in mind when designing documents. Many of these modifications make it possible for screen readers (software that translates text-to-speech or braille for visually impaired people) to convert text into speech.

Description of SLIDE

Styles are used for section headings.

Links are descriptive and meaningful.

Images have text descriptions.

Design is perceivable, with high contrast.

Evaluation is holistic and authentic. (National Center on Accessible Educational Materials 2022a)

Styles

Section headings make it easier to process text and understand how information is organized. Using Styles helps you create and format section headings, and they are more easily navigated by screen readers.

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Figure 2. Text with section headings created in Styles

To use Styles for headings in Microsoft Word:

1. Select the desired heading by highlighting it.

2. In Styles, which appears in the upper-right part of the screen, choose the level of heading you want for your highlighted text. (Heading 1 comes before Heading 2 in your document, and so on.) Once you have done this, your section heading is formatted as a proper heading. (For an example of text with proper headings, see Figure 2.) To modify headings with different colors and other features, click on the style you are using, and then right-click. You will see an option to "Modify."

Links

Screen-reader users can become confused with generic links such as "Click here" and "Follow this link" because they do not know which resource a link is tied to, especially when more than one link is announced the same way in a document. Creating meaningful links helps screen-reader users understand how links are tied to resources. In addition to creating meaningful links, you should avoid inserting the full URL or web address into your document because this can also cause confusion for screen readers (Kalbag 2017).

Here are the steps to create a meaningful link in Microsoft Word:

1. First, write a descriptive text for the link in your document. For instance, instead of saying, "To find out more about our organization, click here," you can write, "Find out more about our organization" (with the entire phrase "Find out more about our organization" linked to the resource page).

2. Select the descriptive text by highlighting it.

3. Right-click to open a menu. Choose "Link" or "Hyperlink" (alternatively, press the "Control" and "K" keys).

4. Insert the URL (or the name of the document to be linked to) into the address bar. Click "OK."

Images

Screen readers can provide information on images in a document only if there is a *text alternative*. (A text alternative [or alternative text] is a description of any kind of non-text content, such as an image, photo, table, or graph.) The most recent version of Microsoft Word automatically generates alternative text. You can edit the suggested text provided as needed. For some versions of Microsoft Word, or to edit alternative text that has been automatically generated, right-click on an image, then select "Edit Alt Text." In the side pane, write a brief description of the picture. (In some versions of Microsoft Word, the "Alt Text" option appears under "Format Picture.") If an image has no meaning beyond serving as a decoration, mark it as "decorative."

Design

Good document design helps make information easier to perceive and process, and is accomplished in a few steps (National Center on Accessible Educational Materials 2022a):

1. Make sure that your document has good color contrast. Low contrast can be difficult for learners with vision difficulties. To check for color contrast in Microsoft Word, you can download the Color Contrast Analyzer tool for Windows and Mac (see https://www.tpgi.com/color-contrast-checker/). This tool will indicate when your document has perceivable contrast. (Figure 3 shows a sample evaluation of a PowerPoint slide using the Color Contrast Analyzer.)

2. Use sans serif fonts, which are easier to read for those with reading and visual impairments. Common sans serif fonts are Helvetica, Avant Garde, Arial, Tahoma, and Geneva (Kalbag 2017).

3. Use a reasonable font size (usually 10 to 12 point).

4. Left-justify your text. Left-justified text has equal spacing between words and is easier to process for some students with learning challenges (Woody 2010).

5. Use clear titles, headings, and subheadings that announce the content to come (Kalbag 2017; Nilson and Goodson 2018; Scott and Edwards 2019).

6. Use sufficient spacing between lines of text (usually 1.5 to 2 lines).

7. Avoid using underlines for emphasis, as they can be confused with web links.

Evaluation

Check your documents to make sure they are accessible. Some authoring tools (such as Microsoft Word and Adobe Acrobat) have accessibility checkers that review your document for accessibility, making recommendations for improvements when needed (Pawan 2016). To access the accessibility checker in Microsoft Word:

1. Click "Review."

2. Click "Check Accessibility." A pane on the right side will open and advise you of any accessibility issues and steps to remedy them. (In some versions of Word, "Check Accessibility" is one of the options under "Check for Issues" when "File" is selected.)

Creating Accessible Presentations

Apply the SLIDE mnemonic to PowerPoint or other presentation slides you use for instruction (National Center on Accessible Educational Materials 2022a). In addition to using SLIDE, Nilson and Goodson (2018) offer the following suggestions for making PowerPoint presentations accessible:

1. Do not use animations; they can be jarring.

2. Do not use auto-timing. It might not align with the amount of time students need to process information.

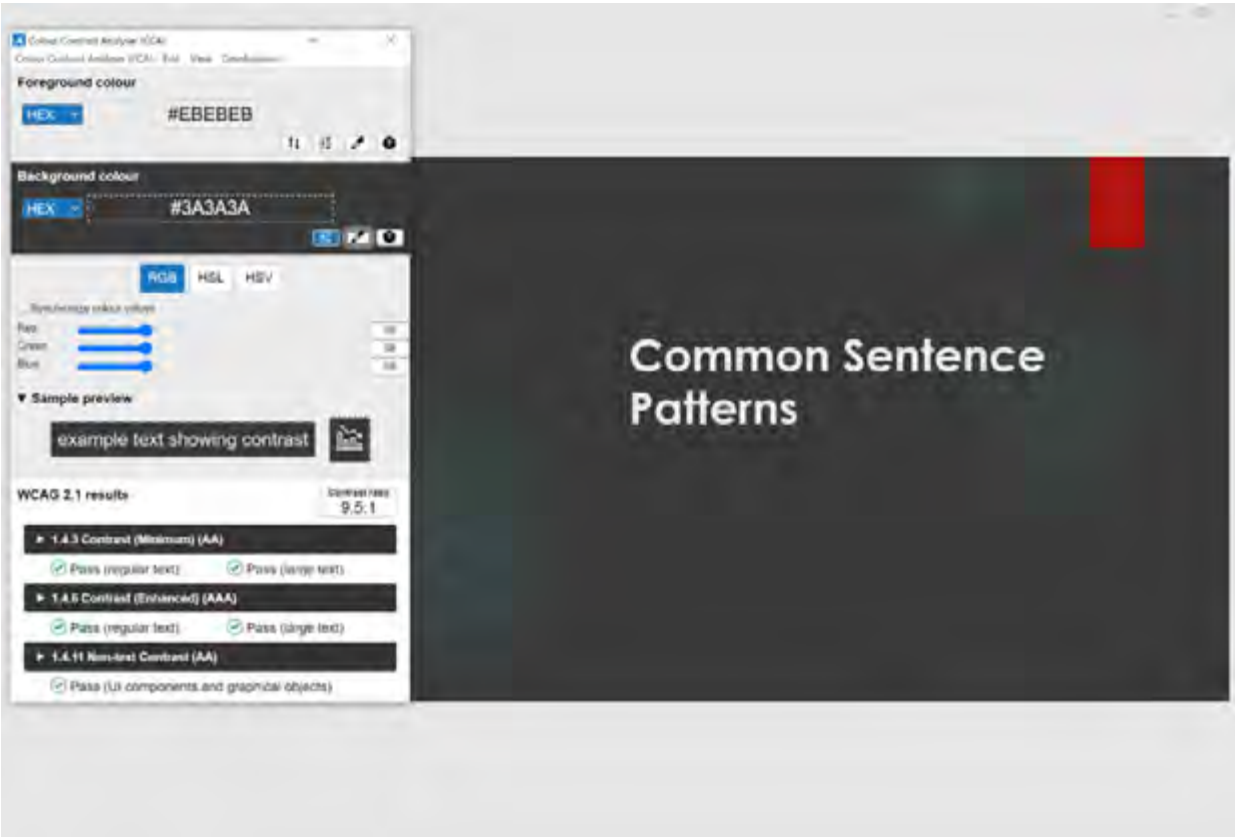

Figure 3. Sample evaluation of PowerPoint slide using the Color Contrast Analyzer

3. Use the default font-size or a larger one so that slides are readable.

4. Choose a slide design that is simple and has good color contrast.

5. Write phrases or sentences in the title box of each slide.

6. Add descriptions to images.

MAKING SOCIAL MEDIA ACCESSIBLE

Social media is increasingly a part of classroom instruction and learning activities. There are a few simple guidelines that make social media posts and content more accessible.

- *Use camel case with hashtags*. Camel case means that each word in a hashtag is capitalized. For example, #KnowledgeIsPower instead of #knowledgeispower. Camel case makes it easier for a screen reader to identify multiple words that do not have spaces between them (Johnson 2016).

- *Make sure images have descriptions*. Screen readers need text alternatives for images. Twitter has added a feature that makes it possible to add a short text description to any image, and Facebook now creates automatic text descriptions through artificial intelligence. To make Instagram and LinkedIn content accessible to screen readers, write a description next to any pictures you post (Johnson 2016).

- *Make sure videos have captions*. If you are uploading your own videos, make sure to add captions. When uploading videos from others, use captioned videos to the extent possible (Johnson 2016).

- *Shorten URL links*. URLs (such as https://americanenglish.state.gov/) are difficult for screen readers to process because they need to read long strings of text. Services such as Bitly and TinyURL shorten links, making them more accessible to screen readers (Johnson 2016).

To summarize, following are key points for creating AEMs:

Videos
- Break content into meaningful chunks.
- Consider video length.
- Add closed captioning to your videos.
- Make your videos interactive.
- Record in a location with good lighting and minimal distractions.
- Make sure your video does not have jarring movements.

Documents and presentations
- Use SLIDE as a guiding principle.

Social media
- Use camel case with hashtags.
- Make sure images have descriptions.
- Make sure videos have captions.

URL links
- Shorten URL links.

HELPING YOUR STUDENTS PRODUCE INCLUSIVE CONTENT

While it is important for you to make content accessible to your students, it is equally important to help students learn how to make their own content accessible. This means guiding them to use the principle of multiple means of representation when they carry out an assignment or task. To introduce the idea of creating accessible materials, bring in sample materials that have barriers to access for some users, such as a video with no captions, a Microsoft Word document without headings and meaningful links, and a podcast without an accompanying transcript. Go through each sample and ask students how it could be made accessible to all users. You might need to provide specific prompts. For instance, you might play a segment of a podcast (with no

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transcript) and ask students how the podcast could be made accessible to users who are hard-of-hearing or deaf.

After students consider the elements to make content more accessible, they might need information on specific steps to create accessible content. You can show students how to add a transcript to a podcast, how to add captions to a video, and how to create proper headings and meaningful links. Make sure they know what they need to do to make their content accessible for each assignment. Helping students design accessible content might take extra time, but doing so ensures that the materials used and shared are accessible to all other students (and potentially other audiences) and develops a mindset of inclusivity. When students produce assignments using multiple means of representation, they not only create inclusive content that meets the needs of a diverse audience, but they also use multiple language skills, which reinforces language learning (Sowell and Sugisaki 2020).

CONCLUSION

Many of us as educators may not have received pre-service or in-service training for providing effective instruction for students with disabilities; inevitably, though, most of us will have students with disabilities in our classes, and there could be more students with disabilities in online courses than face-to-face classes. Even if we are not teaching online classes, we most likely use some technology in our teaching. We should make sure that the choices we make provide equal access to learning for all students and do not cause barriers for any student. Using UDL as a framework, we can design lessons, activities, and materials that accommodate as widely as possible. With a mindset for inclusivity, we can adopt and adapt instruction and technological tools to best meet the needs of our learners. This article was written to provide basics for accommodating students with disabilities in online contexts. As educators, we should embrace the challenge of continually learning how we can best engage and support those students.

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RESOURCES FOR ACCOMMODATING STUDENTS WITH DISABILITIES

Bookshare (https://www.bookshare.org/cms/) provides electronic books for people with learning difficulties. People with blindness, cerebral palsy, dyslexia, and other reading barriers can access a wide variety of books that they can customize to fit their needs.

CADET (http://ncamftp.wgbh.org/cadet/) is free, downloadable captioning software from the National Center on Accessible Media that can be used without an internet connection.

CAST UDL Book Builder (http://bookbuilder.cast.org/) supports the creation of digital books that help to meet the needs of diverse learners. Books created in Book Builder can be shared and downloaded.

Inclusive Learning Design Handbook (https://handbook.floeproject.org/) created by the FLOE (Flexible Learning for Open Education) project provides guidance for making accessible open educational resources (OERs).

Kurzweil 3000 (https://www.kurzweiledu.com/default.html) offers a free trial for software that supports diverse students' learning through any device.

Microsoft Immersive Reader (https://apps.microsoft.com/store/detail/immersive-reader-offline-extension/9PJZQZ821DQ2?hl=en-us&gl=US) is a free extension designed to help readers with dyslexia and dysgraphia. Microsoft Immersive Reader reads text aloud and provides text change options.

UDL Studio (http://udlstudio.cast.org/) provides users the ability to create learning materials that can be accessed by learners with diverse needs. Projects created in UDL Studio can be saved and shared.

WAVE (https://wave.webaim.org/) is a web-based accessibility checker for websites. It is designed to evaluate the accessibility level of a website and recommend potential improvements.

Xerte Online Toolkits (https://www.nottingham.ac.uk/educational-excellence/services/xerte-online-toolkits.aspx) provide a range of open-source templates for creating interactive learning materials that address accessibility needs. Content created in Xerte can be delivered to desktop and mobile devices.

ZoomText (https://www.freedomscientific.com/) is software that allows users to adjust size, color, and motion of content on their computer screens.

AEMs RESOURCES

Federal Social Media Accessibility Toolkit Hackpad (https://digital.gov/resources/federal-social-media-accessibility-toolkit-hackpad/) provides tips for making social media accessible.

National Center on Accessible Educational Materials (https://aem.cast.org/) provides information on creating AEMs.

MOOC

Accessibility: Designing and Teaching Courses for All Learners (https://www.canvas.net/browse/empirestate/empirestate-buffalostate/courses/accessibility-designing-teaching) is a self-paced MOOC on making accessible courses.

Jimalee Sowell is a PhD candidate in Composition and Applied Linguistics at Indiana University of Pennsylvania. She has served as an English Language Fellow and an English Language Specialist. Her research interests include disability studies, teaching writing, peace education, genre analysis, large class pedagogy, and teacher education.