CREATING ACCESSIBLE AND INCLUSIVE ONLINE LEARNING Moving Beyond Compliance and Broadening the Discussion

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Accessibility is a hot topic in online education these days. Despite the increased focus on accessibility, most discussions of creating "accessible" online courses and elearning simply focus on adding alternative text to images and captions to video. In this article, we argue that online educators and workplace learning professionals (including instructors, instructional designers, managers, and administrators) should be thinking beyond compliance and instead thinking about how they can support all learners. We begin by providing an overview of some laws focused on accessibility, we then describe how people struggle learning online at all levels (i.e., compulsory, postsecondary, and workplaces), and then conclude with evidence-based practices on how online educators and workplace learning professionals can support all learners.

INTRODUCTION

Accessibility has become a hot topic in online learning and elearning during the past few years (Burgstahler, 2015; Lederman, 2017; Lee, 2017; Moorefield-Lang et al., 2016). The increased focus on accessibility is due to a host of factors, some of which include the continued growth of online courses and programs, some high-profile lawsuits, and updates in laws focused on accessibility (e.g., the 2017 update of Section 508 of the Rehabilitation Act

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in the U.S.). However, despite the increased focus on accessibility, discussions on creating "accessible" online courses and elearning we contend focus too much on the basics of accessibility, such as the need to add alternative text to images and captions for videos (cf. Ableser & Moore, 2018; Silver, 2016). Equally problematic, we contend, is that while research has shown that making online content accessible—such as through the use of captions—is beneficial for all learners (see Dell et al., 2015; Linder, 2016; van Rooij & Zirkle, 2016; Varonis, 2015), most of the focus on creating accessible online courses and elearning is framed around "compliance" and avoiding legal trouble. We, however, like many others, believe that making learning opportunities accessible to all is not just a legal issue but ultimately an ethical issue (see Burgstahler, 2001; Case & Davidson, 2011; Lin, 2007). But to make learning opportunities—and specifically online learning and elearning—accessible to all learners, online educators and workplace learning professionals need to recognize how diverse learners are and the specific needs different learners might have, and, in turn, the support these learners might need to benefit from learning online, which is much more than alt tags and captions. Throughout this paper, when we refer to online educators and workplace learning professionals, we are referring to anyone working with online and elearning in schools, colleges, and the workplace—such as, instructors, instructional designers, trainers, managers, and administrators. In the following paper, we argue that online educators and workplace learning professionals should be thinking beyond compliance and lawsuits and instead focusing on how they can support all learners. We begin by providing an overview of disability laws and guidelines, we then describe how diverse learners are throughout the United States, and how learners with various needs and disabilities struggle learning online, and then conclude with strategies on how online educators and workplace learning professionals and instructional designers can begin to support all learners.

BACKGROUND

In the following section, we briefly summarize some disability laws and guidelines. We then describe how diverse learners are across all sectors as well as how successful or not learners with disabilities tend to be with learning online. While we approach this from a U.S. perspective, we believe this research is applicable to online educators and workplace learning professionals internationally.

Disability Laws and Guidelines

While creating accessible online learning and elearning is ultimately an ethical issue, there are disability laws and guidelines that online educators and workplace learning professionals need to be aware of.

The Americans With Disabilities Act

Originally passed in 1990, the Americans with Disabilities Act (ADA) is the most comprehensive collection of disability rights, preventing discrimination in employment, state and local governments, public accommodations, telecommunications, commercial facilities, and transportation. This act was updated in 2008 with the creation of the American with Disabilities Act Amendments Act (ADAAA). The ADAAA clarified and expanded the definition of a disability as a limitation of a major life function. This included a broader array of disabilities that were not considered as a disability under the original Act, including activities like eating, sleeping, walking, learning, and concentrating. Additionally, the ADAAA also includes "major bodily functions," such as the immune system, normal cell growth, and the endocrine system as covered by the ADA and chronic conditions like epilepsy (Barry et al., 2009).

The ADA prevents discrimination in several public arenas, such as state and local governments, hotels, restaurants, movie theaters, museums, libraries, doctor's offices, daycare, gyms, and institutions of higher education.

This Act includes the mandate that educational entities and employers with 15 or more employees must be nondiscriminatory. Even private institutions which may not receive certain federal assistance are not exempt, making this Act the most relevant to postsecondary education, as it states:

> Private entities offering certain examinations or courses (i.e., those related to applications, licensing, certification, or credentialing for secondary or postsecondary education, professional, or trade purposes) must offer them in an accessible place and manner or offer alternative accessible arrangements. (ADA, 2010)

Further under the ADA, all private employers, state and local governments, employment agencies, labor organizations, and labor-management committees, are required to provide reasonable accommodations. These reasonable accommodations are required for learning environments as well as performance support systems and communication materials for all workplace functions, from hiring, to training, and job assignments, through to termination of employment.

Rehabilitation Act of 1973, Section 504 & 508

The Rehabilitation Act of 1973 is another important piece of legislation that online educators and workplace learning professionals should know. The Rehabilitation Act of 1973 makes it illegal to discriminate against or exclude a qualified person from any program receiving federal financial assistance (Leuchovius, 2004; U.S. Equal Employment Opportunity Commission, n.d.). The majority of institutions of higher education in particular, receive federal funding and therefore, based on the Rehabilitation Act of 1973, cannot exclude persons with disabilities from any service, benefits, programs, or activities. This regulation extends to nonprofit and for-profit organizations accepting federal grant funding. Online educators and workplace learning professionals should specifically be aware of Section 504 and Section 508 of the Rehabilitation Act.

Section 504 of the Rehabilitation Act specifically prevents an organization or institution from denying someone from participating or benefiting from aids or services as well as by providing persons with disabilities, separate aids, benefits, or services when needed. This protection is extended to all organizations or institutions providing education, healthcare, housing, social services, parks and recreation, or an entire plant or other facilities, for which federal financial assistance is received. For instance, in 2012, a blind student filed an Office of Civil Rights complaint against the University of Montana for inaccessible technology and content, specifically outlining the following:

- inaccessible class assignments and materials on the learning management system, Moodle;
- inaccessible live chat and discussion board functions in the learning management system, Moodle;
- inaccessible documents that are scanned images on webpages and websites;
- inaccessible videos, and videos in Flash format, that are not captioned;
- inaccessible library database materials;
- inaccessible course registration through a website, Cyber Bear; and
- inaccessible classroom clickers (United States Department of Education, 2013).

This complaint was under the authority of Section 504 of the Rehabilitation Act of 1973, as the institution received federal support. Due to these inaccessible elements of the University of Montana's digital ecosystem, this student was denied full participation in aids or services. This sparked institutional change at the University of Montana, as well as change nationwide, as other higher education institutions closely scrutinized the proceedings and effects to proactively make changes in hopes to avoid a similar scenario.

Section 508 of the Rehabilitation Act emphasizes equality in electronic and information technology developed, maintained, procured, or used by the Federal government (Section 508, 2008). Originally, Section 508 focused on accessibility within the federal sphere; however, as LaGrow (2017) explained "it has been widely accepted that colleges and universities are subject to its requirements … because they almost universally receive some form of federal funding" (para 1). Section 508 was last updated in 2017 in response to market trends, innovations, and new technologies. The Act states that these standards "apply to electronic and information technology procured by the federal government, including computer hardware and software, websites, multimedia such as video, phone systems, and copiers." For instance, all analog and digital television displays, and computers are required to be able to display closed captions. And videos (with few exceptions) are required to have open or closed captions (3Play Media Whitepaper, 2018). This update also harmonized requirements with other U.S. and international guidelines and standards, such as the Web Content Accessibility Guidelines ([WCAG] 2008), which are discussed next. While it is common for Section 504 of the Rehabilitation Act, or the Americans with Disabilities Act of 1990, to be the authority in discrimination complaints, Section 508 and its refresh have helped set the tone that higher education institutions, government vendors, and government contractors, all need to provide accessible information and communication technologies, and to establish a baseline for accessible policies.

Web Content Accessibility Guidelines

The Web Content Accessibility Guidelines (WCAG) are the technical standards for making web browsers, authoring tools, evaluation tools, and web content usable for people with disabilities. These are created by the World Wide Web Consortium's Web Accessibility Initiative (W3C WAI), an international, vendor-neutral group (Web Content Accessibility Guidelines). WCAG 1.0 was finalized in May 1999 with version 2.0 published in December 2008 and version 2.1 released in June 2018 (W3C, 1999, 2008, 2018). This trend shows that the guidelines are changing as the web and technology changes, with an update occurring about every 10 years. As technology continues to change rapidly though, WCAG will likely need to respond with more timely updates.

These web guidelines include 3 levels of compliance from Level A (minimum level of conformance), Level AA (more comprehensive), and Level AAA (highest level of conformance). To help describe the different conformance levels, we provide the following examples:

1. WCAG 2.0 Level A: "color is not used as the sole method of conveying content or distinguishing visual elements." This means that if the color represents something specific (e.g., within a map), there needs to be another way that information is communicated, (e.g., through the use of shapes). Otherwise, those who have color blindness would not have access to the information.
2. WCAG 2.0 Level AA: web content should have a "color contrast ratio of at least 4.5:1." This becomes especially applicable in multimedia, and text and graphics are often overlayed, frequently seen in PowerPoints or Google Slides.
3. WCAG 2.0 Level AAA: "a sign language video is provided for all media content that contains audio" (W3C, 1999, 2008, 2018). While it would be ideal for all videos to include a sign language companion, most schools do not do this as a standard practice.

Most schools and institutions strive for WCAG 2.0 compliance, although some are moving toward using WCAG 2.1, the newest iteration of the standard. These standards are more detailed and specific than Section 508 standards. However, LaGrow (2017) explains that the "WCAG 2.0 level AA has been adopted as

the standard of expected accessibility" with the refresh of Section 508 of the Rehabilitation Act (What is WCAG? section). It should be noted that the next major version of WCAG is in the works (referred to as WCAG Silver). Goals of WCAG silver include, but are not limited to, easier to use/reference/understand, expanded scope, inclusive of more disabilities/perspective/technologies, and generally useful for more people interested in, or responsible for, accessible information and communication technology (Spellman, 2019).

Essentially, online educators and workplace learning professionals need to understand and follow the legal directives identified by Section 504 and Section 508 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act of 2008. For compliance, educational entities must meet the technical standards of Section 508, and heavily follow the guidelines provided by WCAG. However, we contend that truly accessible online learning and elearning must go beyond following these legal directives and standards in order to meet the needs of all learners that these educational institutions or organizations may serve. The professionals working at the previously described institutions, agencies, and other organizations, whether they be instructors, instructional designers, managers, or administrators, must begin to think beyond compliance and instead think about how they can create accessible and inclusive learning opportunities for all people.

Supporting All Learners

To make learning opportunities—and specifically online learning and elearning—accessible to all learners, we contend that online educators and workplace learning professionals need to recognize and appreciate just how different learners can be, as well as to understand learners' various needs and the best ways to help them succeed. Historically, technology used as an instructional accommodation was only considered for students with low incidence disabilities (e.g., learners who are blind and/or Deaf or hard of hearing). This was the perspective as evidenced by the Individuals with Disability Education Act 1997 (IDEA 97), but with the latest ratification of IDEA in 2004 this is now no longer the case and any student under 21 years of age may be considered to require technological accommodations that are readily available to all students (e.g., computers, calculators, internet-based resources), thus broadening the perspective that any and all learners might benefit from certain accommodations.

Kindergarten through 12th grade, higher education, and workplace learning environments all deal with disabilities differently. For instance, there are laws and a culture in place in public K–12 schools in the United States to support students with disabilities or exceptionalities (such as IDEA and the development of and IEP—that is, Individualized Education Program—for students with disabilities). Disability, though, is dealt with differently in higher education and workplace learning environments, at least in the United States, where members of these institutions or organizations might strive to meet the previously mentioned laws but essentially then leave it to individuals to self-disclose any disabilities and needed accommodations (Gladhart, 2010; Kimball et al., 2016). However, historically, the majority of learners with disabilities fail to disclose their disability when they enter higher education or the workplace (Grimes et al., 2019; Kimball et al., 2016; Madaus, 2008; also see Santuzzi et al., 2014; Santuzzi & Waltz, 2016). There are various reasons learners fail to disclose their disabilities, whether in higher education or the workplace, that are beyond the scope of this paper to discuss. However, the visibility of one's disability influences to a large degree whether or not the learner discloses it. Invisible disabilities, such as dyslexia, a learning disability, or posttraumatic stress disorder, are much easier to hide. Learners who are blind or Deaf, though, find it harder to hide their disability and due to the visible nature of their disability, coupled with

their needed accommodations, likely have more experience advocating for their needs.

Nevertheless, only a small percentage of learners have visible disabilities, such as a visual or hearing impairment. For instance, at a large public university in the United States, only 3.5% of students requesting accommodations reported that they were blind or Deaf or hard of hearing, compared to 32% of students who reported that they had some type of learning disability. This number becomes more staggering when one thinks about how many students with a learning disability do not disclose their disability (Cortiella & Horowitz, 2014). In the United States, it is estimated that up to 15%, if not more, of school-aged children have some type of disability (see Cortiella & Horowitz, 2014; U.S. Department of Education, 2012) with a majority of these disabilities being invisible to the casual observer (e.g., learning disability, attention deficit hyperactivity disorder, speech or language, emotional and behavioral disorders, and most forms of autism).

When one factors in second language learners or even first-generation college students, the percentage of school-aged children who do not fit the "traditional" mold increases dramatically. And while institutions of higher education have an obligation to support all learners, we believe that colleges and universities should be excited about increasing the diversity on their campuses—both the physical and virtual campuses—but they need to truly recognize that each learner is unique in many ways, with unique strengths and needs, and needs to be supported.

Learners With High Needs Learning Online

The first online course was offered over 30 years ago. Early online courses consisted mostly of nontraditional learners (e.g., students older than 22, students with jobs, students with families). However, over the last decade or so, students from all walks of life—both traditional and nontraditional, in K–12, higher education, and the workplace—are now learning online, whether that be by completing online training, taking online courses, and, or completing entire online degrees (Allen & Seaman, 2017; Picciano et al., 2012).

There are various reasons people choose to learn online (whether in informal learning experiences such as attending a webinar or completing a MOOC or more formal ways such as completing a training, a course, or an entire program online). For instance, people might decide to learn online for any of the following reasons (and many more):

- they live in a rural area (or even another state or country) where learning online is the only way to further their education;
- they are working full time and unable to attend classes on campus when classes are offered;
- they have child care issues;
- the course, or program, is only offered that semester or even at all in an online format;
- the online course fits better, in terms of overall scheduling, with their work and school schedule;
- as a type of credit recovery or remediation; that is, they were not successful in the face-to-face course but have a chance to take the course again online at a later date;
- because they are a second language learner and need additional time to overcome the language barrier;
- physical, behavioral, or mental health issues might prevent or make it much harder to take classes in a traditional format on campus;
- It is cheaper; or
- they think it might be easier (Fox, 2017; Hartnett et al, 2011; Henry et al., 2014)

An important message here is that, as Veletsianos (2020) recently explains, "there is no single kind of online student" (p. 22); thus, there is no one single reason why students decide to learn online. Many students end up taking courses online, not because they want to but because they have no other option. At the same time, many others end up choosing to learn

online because they prefer the online format or simply for pragmatic reasons, such as scheduling to do so. And finally, some might complete an online training or online course because their employer requires them to do so. While there might not be one type of online student or one reason people choose to learn online, some common reasons include convenience, flexibility, and accessibility (Henry et al., 2014; Levitz, 2017).

One important affordance of online learning is the access and accessibility it provides learners. While we often think of this access or accessibility in terms of how it enables people who live at a distance or whose busy day-to-day life does not enable them to complete their education face to face, it is important for online educators and workplace professionals to remember that learning online is critical, and sometimes the only realistic option, for students with disabilities to complete or further their education (Veletsianos, 2020).

Unfortunately, though, not every learner is successful learning online. For instance, research has consistently shown that dropout rates are higher in online courses than face-to-face courses (Angelino et al., 2007; Boston et al., 2009; Patterson & McFadden, 2009; Willging & Johnson, 2004). There are many reasons why people might have an unsuccessful learning experience. Veletsianos explains how

> dropout and attrition are complex problems stemming from student factors (e.g., lack of preparation), course program factors (e.g., lack of interaction at the course level or lack of community at the program level), and broader environmental factors (e.g., lack of community/societal support). (p. 47)

A less talked about reason why some dropout might be because of the larger percentage of learners with high needs taking courses online. With online courses, these students—many of which might have struggled in various ways in traditional classes—find themselves in a strange learning environment that is very different than the environments they might have encountered growing up. While some students with high needs thrive in this new environment, many students with high needs end up dropping out (see Jaggars, 2014; Jaggars & Bailey, 2010; Xu & Jaggars, 2011).

In many ways, as enrollments in online courses, online programs, and online training and workshops increases, online learners will increasingly represent a fuller range of society. Consequently, employers will need to provide more accessible online workplace learning, elearning, and performance support materials, in the future. Online learning—whether that be in informal ways, in K–12 schools, in higher education, or the workplace—has unique affordances to support all learners, especially those with disabilities or various special needs, in unprecedented ways. But these same online learning experiences can in turn present additional challenges for learners, challenges that alt-text or captions on videos are not going to fix. In the following section, we discuss ways that online educators and workplace learning professionals can create online learning experiences that can better meet the needs of all learners.

STRATEGIES FOR MAKING ONLINE LEARNING ACCESSIBLE, USABLE, AND INCLUSIVE FOR ALL

People increasingly are learning online in both informal and formal ways, at home as well as in schools, colleges, and the workplace. However, as online learning increases and a greater range of people are learning online, it is becoming critical to ensure not only that everyone has access to learn online but that online learning is truly accessible, usable, and inclusive for all. In the following section, we briefly provide an overview on three separate areas that online educators and workplace learning professionals need to focus their efforts to accomplish this; namely, accessible online learning experiences need the following:

- accessible and usable courses and content;

- accessible and inclusive pedagogy and course design; and
- accessible and inclusive teaching.

Accessible and Usable Courses and Content

Accessible online learning in many ways begins and ends with accessible and usable online courses and accessible content. If a learner cannot successfully login to and navigate an online course—for instance, one that is hosted in a learning management system (LMS)—the learner cannot have a successful online learning experience. Some places recommended for online educators to include a statement and/or link in their syllabus and/or course about the accessibility of all required technologies. The basic idea is that online educators and workplace learning professionals need to be aware of how accessible the technologies and platforms they use in their online courses really are. This is less of an issue with the larger educational technology companies (e.g., Blackboard) who are accustomed to ensuring that their product meets the various disability laws and guidelines, but it regularly becomes a problem when online educators decide to add additional tools and technologies to their online courses (e.g., a third party blogging tool). Further, and perhaps most importantly and most frequently, is the fact that online educators and workplace learning professionals regularly, and often unknowingly, add content inside an LMS that is inaccessible, or not usable or user friendly, for learners with disabilities; or they link to content outside of the LMS (e.g., a PDF or Google Slide Deck) that has accessibility issues. Compounding this challenge is the varied amount of content used, for instance, in online courses, most of which online educators did not create in the first place (e.g., physical books, text files, datasheets, presentation files, videos, software applications, and interactive content). Due to the variability, providing only one all-encompassing checklist for accessible courses and content is not realistic. However, the fundamental start to creating accessible content is to understand the user's experience. Below we briefly describe how learners with a disability may experience content. Following these summaries are a few examples of checklists that are available.

Auditory Content That Must Be Consumed With Sight

As technology advances, more learners are consuming and accessing content using various adaptive technologies. For example, learners with low vision, or eye fatigue from chronic conditions, might need magnification software that allows for a customizable visual experience. One magnification software, ZoomText, advertises flexible magnification levels up to 36x, options to fine-tune the thickness and spacing of text for added legibility, and [adjustment] of the size and color to make easy to see the mouse pointer, reducing improve screen clarity and reduce eyestrain (Ai Squared). While providing an electronic version of a textbook or reading is a sufficient start to addressing learners needs with a possible visual impairment, online educators and workplace learning professionals may not realize the negative impact of providing documents that are scanned crookedly, contain handwriting, underlining, or highlighting, containing text that is cut off, or when there is poor contrast between the background color and text (Coombs, 2010). These seemingly small details have a significant influence as to whether the learner is able to engage with the content, as well as the duration of the engagement. Further, striving to have digital texts and resources that can be magnified or even searched can help all learners. This is not to suggest that all texts must be digital; there is various research that suggests that some learners also struggle with reading digital text. However, whenever possible, online educators should strive to provide readers multiple means of representation (which will be addressed in more depth later on in this section). Related is the need to include closed captioning or minimum a transcript when using

video or multimedia that relies on sound to convey its message. Coombs explains how transcripts help students with normal hearing because:

- skimming the text is quicker than listening to the audio;
- the reader can underline and annotate the text;
- the text can more easily be shared with others; and
- listening tends to be a passive activity, whereas reading is more active and therefore better for learning (p. 105).

Visual Content That Must Be Consumed by Sound or Touch

Learners who have a learning disability, a traumatic brain injury, or Attention-Deficit / Hyperactivity Disorder (ADHD), might rely on text-to-speech (TTS) technology. TTS involves having a computer synthesized voice speak text, with the ultimate goal of creating a natural sounding speech (Siddhi et al., 2017, p. 26). TTS often includes features like different voices, the ability to adjust the speaking speed, words highlighting in conjunction with speech, or the option to export synthesized speech into an MP3 file. The potential to find a synthesized voice that works is great. Apple's macOS Sierra operating system boasts 88 built-in voices (excluding the novelty English voices like Pipe Organ or Bubbles), including languages like Thai, French, Hungarian, Turkish, and so on (macOS Sierra, 2017). The ability for text to be spoken with TTS is imperative. The easiest way to test the "speakability" of a document is to highlight words, copy them, and then paste them into a separate text document (like Microsoft Word or Pages or Google Docs). If text can be highlighted, copied, and pasted, it can be read with text-to-speech technology. Avoiding image files—that is, files where text cannot be copied and pasted (e.g., a PDF that was created from a photocopy of a book chapter)—is critical to ensure that all students are able to read and engage with content. Using an optical character recognition scanner (i.e., a scanner that can convert printed text to digital text) can help make text accessible to TTS technology. However, there are times where part or even the majority of a document might be readable by screen reading technology, but certain images or tables within the document cannot be read because when they were converted to a PDF the image or table were not converted properly. Research suggests that there is a prevalence of scanned files/image files across colleges and universities. In one study, for instance, Straumsheim (2017) found that across 700,000 courses, approximately 12.8% of the content was scanned PDFs—that is, PDFs that were inaccessible to students who rely on TTS technology.

Screen readers, which use TTS, "are the most popular assistive technology utilized by users with visual impairment (either full visual impairment or partial visual impairment)" (Lazar et al., 2007, pp. 249–250). Screen reader users access information on the computer [and mobile devices] differently than those with sight. The device becomes a self-speaking tour guide, voicing aloud where the user is at navigationally as well as what content the user has selected. The keyboard is the sole means of navigation, as a mouse is generally unhelpful for those who are blind. These users memorize hundreds, if not thousands, of keyboard shortcuts to control the computer—opening/closing programs, crafting documents, searching the web, joining a webinar, navigating from the desktop to a window, reading electronic files, et cetera. Southwell and Slater explain (2013),

> web page content is spoken aloud in a strictly linear order, which may differ from the visual order on screen. Instead of visually scanning the page to look for the desired content, screen-reader users can use the "find" or "search" function to look for something specific or use one of several options for skimming the page via keyboard shortcuts. (p. 35).

Online educators really should be aware of how their content would sound if spoken. For instance, with nontext elements (e.g., images, charts, and diagrams), a screen reader will voice the alternative text or alt text. WebAIM (2017), one of the international leaders of web accessibility expertise, explains that alternative text "provides a textual alternative to nontext content in web pages." Essentially, the content creator needs to describe the image in text, highlighting the most important information of that image. This alternative text is often not visible without adaptive technology. When a learner using a screen reader comes upon an image, the screen reader will identify it as an image, then read the alt text. This communicates the relevancy of that image. This is true for images in text documents, PDFs, HTML, PowerPoint presentations, and so forth. Regardless of where the image lives, alternative text must be included or screen reader users are unable to reap the benefits of the image.

Being intentional about how content is structured is important. Properly using headings and avoiding using tables when they are not required to present content, as well including captions and headings when tables are used, can help learners using screen readers to effectively and efficiently navigate web content (Coombs, 2010). When a table is needed to display information, providing a caption and headings for columns and rows in the table are needed. Coombs (2010) also recommends providing a brief summary as a text explanation of what is in the table. This same approach is helpful, if and when, a braille ready file is needed to be created. Some learners who are blind or have a visual impairment need content turned into Braille, a tactile format. The best way online educators and workplace learning professionals can begin to prepare for producing a tactile version is to ensure that all of their content is available in a text file or HTML. These text files or HTML content must be structured by using heading styles instead of bold, italics, or underlining. Depending upon its complexity, the well-structured document may be easily turned into a braille ready file, a file that can be embossed by a braille printer or used with a refreshable Braille display—a device that will create "live" Braille by turning the file into dynamic raised dots. This file type and device allow a Braille user to read and produce content in Braille. Online educators, though, should be prepared to work with accessibility experts to add additional markup before the braille ready file is completely ready to be delivered to a Braille user.

In summary, it is critical for online learning and workplace learning professionals to ensure that the courses they develop, as well as the content they create or use inside of the courses, is accessible to all learners. Some standard ways to ensure that content is accessible from a technological standpoint is to do the following:

- Provide content in an electronic format that is free from crooked scanning, poor contrast, and highlighting/underlining/handwriting. Text should be clear, clean, and accessed by text-to-speech and screen reading technology.
- Ensure that all documents (including PowerPoint presentations) appropriately use levels of headings and avoid the overuse of complicated tables, and use color carefully.
- Include alternative text for images in any file type.
- Include closed captions or a transcript for all auditory content.
- Ensure that all electronic documents are available in a text document or HTML or both.

The aforementioned list is not meant to be exhaustive. One can find dozens of accessibility checklists focused on making content accessible with a quick Internet search. Table 1 lists a few useful resources that one might begin with.

Accessible and Inclusive Pedagogy and Course Design

As critical as it is for online educators and workplace learning professionals to be compliant with current disability laws and guidelines

TABLE 1
Accessibility Checklists and Resources

National Center on Accessible Educational Materials

http://aem.cast.org/

This is a collection of resources about the National Instructional Materials Accessibility Standard for administrators, educators, learners, workplace learning professionals, and other accessible educational media (AEM) producers. The resources help individuals procure AEM, access strategies to support infant through workforce learners, review policies, rights, and quality indicators, and guidelines for designing AEM, publishing AEM, implementing AEM, and evaluating AEM.

Penn State, Accessibility Checklist

http://accessibility.psu.edu/checklist/

This checklist also includes instructions on how to produce accessible files in Microsoft office, Canvas, Wordpress, and other web pages.

Stanford Online Accessibility Program, Checklists

https://soap.stanford.edu/getting-started/checklists

This site links to several different checklists, for educators, administrators and workplace learning professionals, who already have a basic knowledge of accessibility.

University of Montana, Faculty Guide

https://www.umt.edu/accessibility/getstarted/checklists/fac-guide.php

This checklist covers textbooks, learning management system (LMS) content, class documents, software, hardware, library electronic resources, websites, webinars, third party content, audio, video, course packs, and guidelines for national standards.

University of Washington, Creating Accessible Documents

http://www.washington.edu/accessibility/documents/

This site provides instructions on how to create accessible MS Word documents, high quality scanned documents, and PDFs from MS Word, Adobe InDesign, and Acrobat Pro.

University of Washington, Creating Accessible Videos

http://www.washington.edu/accessibility/videos/

This site provides instructions on how to create accessible videos, including captions on YouTube, webpages, Panopto, Canvas, MediaAMP, and Facebook. Also, instructions about and services for audio descriptions are also provided, which are needed for content that is only presented visually.

by ensuring access to the online learning experiences and the content they create, we contend that this simply is not enough. In the past, to create high quality online learning experiences, especially at the K–12 and higher education levels, online educators focused to a large extent on how online courses were designed (Lowenthal & Davidson-Shivers 2019). During the late 1990s and early 2000s, quality assurance frameworks, consisting of standards and corresponding rubrics, like Quality Matters were being developed to help

guide the initial design, as well as to evaluate and improve the overall design online courses (Lowenthal & Davidson-Shivers 2019). In many ways, the belief was, and in many ways still is, that creating a high-quality online learning experience begins and ends with the design of the course. Around the same time, the concept of the Universal Design for Learning (UDL) emerged, influenced in part by the larger Universal Design movement and corresponding cultural and legislative changes (e.g., ADA). According to Meyer, Rose, and Gordon (2014), the goal of UDL from the beginning was to leverage "the flexibility of digital technology to design learning environments that from the outset offered options for diverse learner needs" (p. 5).

The three core principles of the UDL framework are to provide (1) multiple means of engagement, (2) multiple means of representation, and (3) multiple means of action and expression (Meyer et al., 2014), which are described below in more detail. Increasingly online educators and workplace learning professionals have turned to the UDL framework to help create accessible online learning courses and experiences. However, in practice, we have found that online educators attempt to apply UDL principles often results in online educators simply offering content in multiple formats (e.g., a video and a reading) and then enabling students some options in how they demonstrate their learning (e.g., write a paper or do a presentation). As helpful as this approach might be for many learners, we posit that it does not go far enough in creating accessible, usable, and inclusive online courses and online learning experiences. In the following section, we argue that online educators and workplace learning professionals need to begin employing inclusive pedagogical design choices, which are not only about universal design but also about proactively employing empathetic design, while also being flexible and empathetic with students while a course is being taught. Employing accessible, usable, and inclusive pedagogical design choices can make a difference for the small number of students who have visible disabilities, in addition to supporting a much larger population of individuals who have invisible disabilities or other undocumented learning challenges. For example, individuals with learning disabilities, test anxiety, English language learners, and others with poor previous academic performance, would all benefit from preplanned, more accessible, usable, and inclusive learning experiences. In the following paragraphs, we present a variety of design and teaching strategies, which can help make online learning more accessible and inclusive. Similar to the previous section, this section is not meant to be exhaustive nor suggest that each strategy is appropriate for all contexts and environments, but simply to present various strategies that will help online educators create accessible courses.

Multiple Means of Engagement

One of the first recommendations to creating accessible and inclusive online learning experiences is recognizing that not all learners are the same; different things interest and motivate and even scare different people. Therefore, UDL argues for the need to provide options to recruit interest, sustain effort and persistence, and for self-regulation (Meyer et al., 2014). Simply put, online educators need to recognize that all learners might not be naturally interested in the topic of a given course or learning experience and therefore online educators should strive to help the learners see the relevance in the course or topic, provide authentic assignments, but also provide some choice in terms of focus as well as challenge. Further, one should strive to vary their instructional strategies (e.g., lecture, case studies, small group work) to help diverse learners whether that be within class sessions, within the week, or throughout the course.

Multiple Means of Representation

The UDL framework also recommends using multiple means of representation. We believe this is not simply including content in

multiple formats (e.g., weekly reading, video, and podcast), but rather it entails, whenever it is possible and realistic to do so, providing course content in more than one format. This could entail finding a video to describe a concept that the textbook focuses on or it could entail finding animations or images to support and illustrate different ideas. Or this could simply focus on having different authors describe the same concept in different ways. As Coombs (2010) points out, focusing specifically on the use of graphics,

> Using graphics cannot only make the content more visually appealing and interesting...a chart or diagram may convey information better than can be done verbally. Some learners, including those with learning disabilities and cognitive disabilities, often learn better from visual representations. That said, it is important not to clutter document with graphics for the sake of decoration. (p. 25).

But multiple means of representation also entails helping students connect the dots and activate their prior knowledge, which could be in various ways but one way might be by adding introductions and summaries as well as transparent assignments (which are discussed later on).

Multiple Means of Assessment

The last part of the UDL framework is the importance of providing multiple means of assessment or what they refer to now as "action and expression." This is important for all learners, but especially for students with disabilities or struggling learners, because some learners simply are not good at certain types of assessments. For instance, some learners suffer from test anxiety and therefore struggle demonstrating what they have learned in a course that relies predominantly on high-stakes tests. Other learners might have a fear of public speaking and therefore really struggle giving presentations to a class. Varying assessments and avoiding high-stakes assessments can help learners better demonstrate what they have learned. Further, online educators should use some type of formative assessments throughout a course to help learners build their knowledge and skills in stages (e.g., multiple-deliverables for a larger project with feedback cycles) and to help them identify where they might be struggling. This is not to suggest that it is wrong to have students complete a quiz or an exam. There are times when students need experience completing assessments like these (e.g., to help prepare them to pass a professional certification exam) or when the nature of the online course dictates their use (e.g., high enrollment courses or self-paced elearning). However, more often than not this type of assessment can be avoided and whenever possible, one should avoid using timed exams that might cause undue anxiety and stress. Another strategy is to allow learners to redo assignments to pick up some or all of the points they lost, as well as to provide personalized constructive feedback on formative and summative assessments. However, it is important to note that in many workplace learning environments, this might be difficult to implement in practice, especially in certain self-paced (non-facilitated) online learning situations.

Create Transparent Assignments

All learners benefit from transparent assignments (see Winkelmes et al., 2016). Whenever it is appropriate, online educators should clearly state the purpose of an assignment, include clear instructions, and then include a checklist of expectations and/or a rubric and even some exemplars. Each of these can help set clear expectations for learners and help them understand what is expected of them and what success might look like. We recognize that there are times, for instance, that one might not want to provide an exemplar because it might limit creativity or there might be times when part of the objective is for learners to figure something out on their own (e.g., solving ill-structured problems). However, more often than not we have found that making assignments more transparent will not take

away from the learning experience and instead help increase the odds that all learners will be successful.

Consistent and User-Friendly Design

The human brain looks for patterns. A consistent, simplified, and predictable design both within, and possibly across courses, decreases cognitive load for all learners, because learners do not need to spend limited working memory resources on learning the structure of the learning environment. A consistent structure across all courses, or at least similar courses, allows learner navigation to become more fluid or even automated. However, usability is just as important as consistency when it comes to creating accessible online courses. Whether an online educator is using an LMS or a rapid authoring tool like Articulate, they need to think through the usability of the course for all learners. This often involves thinking through the larger course structure, as well as the structure of the content on individual pages. Often simply trying to minimize the number of clicks a learner must use to access content is an important step in the right direction but one should also focus on using consistent headings and a consistent look and feel from page to page.

Modularize Course Content

A module is a unit, chapter, or segment of instruction. To modularize content, one groups all necessary information in one area. Generally, a module starts with an introduction or an overview and then presents new content. Depending on the learners needs, the context, and the objectives, a module might include some or all of the following: discussions, assignments, interactions, labs, practices, worked examples, assessments, evaluations, and reflections. In most cases, a module might end with a summary of key points.

By grouping content into one area, learners find navigation easier. This approach of chunking lessons into "bite size" pieces, Coombs (2010) explains, "has long been advocated as an important learning tool for students with disabilities, especially those with learning cognitive disabilities" (p. 24). However, Coombs (2010) goes on to explain that chunking benefits all learners and especially those with a learning disability, those using a screen reader, those using assistive devices for physical impairments, or learners with hearing impairments and nonnative speakers without disabilities. Modularizing or chunking content, Coombs argues though, also implies that the content is well organized, with a good structure that uses headings that provide a visible framework.

Chunking content is also important when it comes to using instructional media. For instance, rather than having learners watch 90-minute lectures, online educators should chunk the media into smaller units (or have learners watch parts of it at different times) that enable learners to interact with the content in smaller chunks. Providing an overview of video clips and even guiding questions can help serve as an advanced organizer for learners and help guide struggling learners on what they should be focusing on.

While modularizing content helps all learners, issues can arise when content is modularized into too small of chunks (i.e., too granular) or when future modules are date restricted. Some argue that making all of the modules in an online course available to learners all at once can be overwhelming (especially for struggling learners), whereas others argue that hiding the content of future modules appears secretive, punitive, and inhibits learners from working ahead. We have found that there is often a middle ground where one can make the current module and the following module visible to learners while date controlling future modules when needed.

Improve Readability by Simplifying Language

Online courses tend to be text heavy. In fact, this is part of the appeal of learning online, one can interact with content or other

people at anytime, anywhere. Further, the text-based nature of most asynchronous learning environments enables learners to take their time reading, and if necessary, rereading, their course content, whether that be course readings, specific activities or assignments, or discussions. However, online educators often do not spend enough time thinking about and editing and improving the text they put in their courses. Online courses often read like textbooks, which require a certain level of academic literacy to make sense of. We believe, however, that most text in online courses can and should be simplified to be approachable to all learners. While there are some disciplines that require learners to be able to read and decipher dense text (e.g., philosophy or law), even in these situations it likely would help learners to have instructional environments where their instructions are clear, accessible, and inclusive. Some of the easiest ways to write instructional content that is more readable and inclusive is to:

- write short sentences;
- use an active voice;
- test the reading level to ensure it is age appropriate (and consider simplifying it one or two grade levels more);
- avoid jargon when possible;
- chunk content and use headings to illustrate the structure;
- provide an overview and summary when possible; and
- when providing examples, ensure that they are representative and are understandable and meaningful to all possible learners.

These approaches support all novices, and especially individuals with learning disabilities as well as those who are using a second or third language to participate in a learning environment, but they also can help all learners by enabling them to quickly and efficiently read and understand the content. We have found that simplifying the language does not dilute the content but instead makes it accessible to a larger audience.

Attend to Social Presence and Community Building

Research suggests that some learners feel isolated and alone when taking online courses. One way to address this is through developing social presence and a sense of classroom community. Social presence is the degree to which others are perceived as being "there" and "real." Fostering opportunities for learners to interact with, get to know each other, and ultimately learn from and support one another (e.g., peer instruction, group work, teamwork) can help establish social presence, which can then help learners start to develop a sense of classroom community. Learners with a disability, or struggling learners in general, can benefit from knowing that they are not alone and there are others there to support them. But as important as learner-to-learner interactions and relationships are, online instructors play a critical role in online courses and there are many ways that online instructors can reach out and get to know their learners better. For instance, adding language to the syllabus that demonstrates that the instructor has an inclusive mindset or having a precourse survey with questions on a learner's background, strengths, and fears can help serve as building blocks to establishing social presence. Or an instructor can try to have a meeting with each learner at the beginning of a course (e.g., a 5-minute phone call).

However, at the same time, it is important to note that some learners choose to take online courses because they want to remain anonymous in many ways. For example, a learner with a physical disability might not want others to know that. At the same time there are learners who find it really difficult to socially interact with others (e.g., introverts) or who simply dislike social presence and community building activities. Getting to know more about one's learners (e.g., knowing their background and identify preferences) can help prepare online instructors for the different type of learners they have.

Accessible and Inclusive Teaching

Creating accessible and inclusive online learning experiences for all learners involves more than effective design. First off, a well-designed course can be ruined by a poor, ineffective, and/or absent instructor. Similarly, a skilled online educator can take a poorly designed course and often make some significant changes on the fly to improve the learning experience. The bigger point, though, with this last section, and one that is not focused on enough in the literature, is that a lot of things happen once an online course is being taught that were not foreseeable before the course began. For instance, some learners might have employment changes or family issues or health concerns arise; other learners might have natural disasters to contend with; still others might find that the pace or workload is much harder to manage than they originally thought; and yet others might find that their invisible disabilities (whether that be a learning disability or dyslexia or something else) present unforeseen issues that they had not faced in the past; the list of course could go on and on. The point, though, is that there are some just-in-time accessible and inclusive teaching strategies that online educators can employ that could help some, or maybe even many, struggling learners persist and be successful. It is important to note, though, that there are situational factors that might make it difficult or impossible in some situations to implement some or all of these strategies (e.g., high-enrollment or self-paced, nonfacilitated, online courses).

Get to Know Learners

One of the first things an online instructor should strive to do is to get to know his/her learners. We mentioned some ways that this can be done from a design perspective (e.g., a precourse survey), but a big part of this involves active and intentional effort by an instructor while a course is being taught. For instance, it is one thing to ask for information about learners' background at the beginning of a course but this information only matters if an instructor uses it—such as by identifying learners who might need more support and then actively following up with these learners. Further, this suggests that it is important for online instructors, when practical, to make an effort to get to know more about each learner as the course progresses through reading and participating in online discussions and assessing and providing feedback on students' assignments.

Regular and Equitable Interaction

In addition to getting to know one's learners, online instructors should strive to have regular and substantive interaction with their learners but also ensure that there is equitable interaction between learners. First off, regular and substantive interaction of instructors is important because it helps learners get a sense of an instructors' teaching presence and instructor social presence. This in turn can help learners perceive that their instructor is more approachable and ultimately interested in their success. But, just like face-to-face courses, some learners might have a tendency to dominate discussions while others might have a tendency to sit back and lurk. While there are some design strategies one can employ to ensure equitable interaction (e.g., discussion protocols), regularly monitoring and at times taking part in online discussions (and even emailing learners directly when they are dominating or not participating enough) can help create accessible and inclusive learning experiences.

Timely Feedback

We live in a world where most people expect immediate service and answers to any questions they might have. Therefore, it is not surprising that online learners often expect their online instructors to be available 24/7. We think that this is not realistic or recommended. However, letting multiple days or

even weeks go by before responding to learners' questions or not grading assignments in a timely manner can be problematic, especially for struggling learners. Quality assurance frameworks, such as Quality Matters, recommend that online instructors strive to respond to questions within 24–48 hours. There is less guidance on how fast one should provide feedback on assignments (though generally many think the faster the better). However, when one gets to know his or her students and has identified students who might struggle, they should strive to grade and provide feedback to these students as soon as possible (in part to allow them to redo it); this might simply involve grading these learners assignments first each week or even providing them extra feedback when needed.

Monitor Learner Progress

Part of creating accessible and inclusive online learning experiences entails monitoring learners progress. In other words, it is one thing to get to know one's learners, regularly interact, and provide timely feedback, but it is quite another to identify which learners are struggling or perhaps absent from the course. Struggling learners often might not reach out for help. Therefore, it is critical for online instructors to pay attention and make notes when they grade assignments of which learners are struggling as well as which learners might be really excelling, because they might need to reach out and intervene with either of these groups of learners to help ensure that they are having a successful learning experience. While the grade book in a LMS is one place to monitor learner progress, most LMSs also provide some analytics and/or reports that can help identify learners who might be struggling.

Synchronous Communication

One of the affordances of online learning is the ability to learn asynchronously at any time of day. However, an increasing number of online educators are designing some form of synchronous communication into their online courses (e.g., live web meetings or webinars), because of some of the many benefits of being able to talk to people (and possibly even see them) in real time. But, even if one does not have any planned synchronous events in their courses, scheduling a one-on-one web meeting or even just calling a struggling learner on the phone can go a long way in helping them feel supported and included and ultimately successful. Further, if and when one has live web meetings, it is important to consider adding live captioning or signing as well as to carefully monitor the chat for questions and to specifically solicit and repeat questions.

Remaining Flexible

Last, but certainly not least, creating accessible and inclusive online learning experiences requires online instructors to remain flexible and cognizant of their learners needs. What works one semester might not work as well during another semester. Soliciting feedback while a course is being offered (e.g., by emailing learners or creating an anonymous survey) can help an instructor get a better idea of how things are going and whether some just-in-time changes need to take place. But it is also important for online educators to be empathetic and flexible to individual learners needs. This might mean giving a learner extra time to complete an assignment or letting another learner redo an assignment or even customizing an assignment or project to better align with a learner's needs, strengths, or interests.

IMPLICATIONS AND CONCLUSION

Online learning is becoming common place. However, despite this, too many learners—especially those who might need to learn online the most, such as those with a disability—struggle learning online and end up dropping out at higher rates than learners in face-to-face courses and programs. We posit that

online educators and workplace learning professionals have a responsibility to support all learners in the courses or learning experiences that they design and offer. There is increased interest in making online courses accessible and compliant with current laws and guidelines. As important as this is, we find that simply making content accessible is not enough. Online educators and workplace learning professionals need to begin thinking of other ways that they can not only make the content and courses accessible and usable but also how they can use accessible and inclusive pedagogy and course design strategies and accessible and inclusive teaching strategies to create accessible and inclusive online learning experiences for all. This paper was not meant to be exhaustive but simply to help broaden the larger discussion beyond focusing only on compliance.

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