



# Accessible and inclusive online learning in higher education: a review of the literature

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## Abstract

Disabled students are increasingly choosing to attend higher education. Online learning has the potential to meet the needs of disabled students in unique ways. However, questions remain about how well online learning is meeting the needs of disabled students and in what ways institutions are prepared for and actively providing students with accessible and inclusive online learning opportunities. This paper presents the results of a literature review of 91 sources focused on accessible and inclusive online learning. Themes that emerged from the literature are discussed, as are future implications for research and practice.

**Keywords** Accessibility · Inclusive · Online learning · Course design · Universal design for learning

## Introduction

Institutions of higher education have a more diverse student body than ever before. In particular, disabled students are increasingly choosing to attend higher education (NCES, 2019; Safer et al., 2020). The most reported disabilities in higher education include mental illness/depression (40%) and attention deficit disorder (26.4%); however, other common disabilities include visual, hearing, speech, mobility, and learning disabilities (Campbell & Westcott, 2019). Many students also experience multiple disabilities simultaneously. Research suggests that the actual number of disabled

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students in higher education is larger because most students do not disclose their disabilities (Izzo et al., 2008; Roberts et al., 2011; Schelly et al., 2011).

Online learning has the potential to meet the needs of disabled students in unique ways. First, disabled students can benefit from the flexibility and convenience of learning on their own schedule in their chosen location (Linder et al., 2015). Other students (e.g., with dyslexia and attention-related disabilities) can benefit from having access to organized online materials, activities, and assessments as opposed to “piles of paper” they might receive in face-to-face courses (Nieminen & Pesonen, 2020a, 2020b, p. 10). Online learning can also reduce the need to accommodate separate exam locations and help others eliminate visual and auditory distractions often found in lecture halls (Nieminen & Pesonen, 2020a, 2020b). Finally, others who struggle with social interactions might benefit from online discussions and recorded lectures that minimize or change student interaction (Satterfield et al., 2015).

However, questions remain about how well online learning is meeting the needs of disabled students and how institutions are prepared for and actively provide students with accessible and inclusive online learning opportunities (Cai & Richdale, 2016). Given this, we reviewed the literature on accessible and inclusive online learning. In the following paper, we present the results of our inquiry and implications for research and practice.

## Background

The terminology used when discussing disability, accessibility, and inclusion is contested. Often, the terms “accessibility” and “inclusive design” are used interchangeably when they have different meanings (Microsoft, 2016; W3C Web Accessibility Initiative, 2022). Accessibility is often described in terms of technical requirements—e.g., backend code, user interaction, and visual design (W3C, 2022)—that comply with legal mandates and guidelines (W3C, 2022). Legal mandates (e.g., Section 508 of the Rehabilitation Act of 1973) rely on industry accessibility standards such as the Web Content Accessibility Guidelines (WCAG) (Bonitto, 2021). Accessibility is considered a *quality* or *attribute* that makes experiences open to all (Microsoft, 2016). Regarding course design, accessibility features could include providing alternative text for images, enabling accurate captions for multimedia, developing consistent course navigation, using plain language, and ensuring compatibility with a variety of devices, including assistive technologies.

WCAG’s technical language is intended for web developers and can be complicated for faculty and instructional designers (Lowenthal et al., 2021). Inclusive design is a *methodology* to design “a diversity of ways for everyone to participate in an experience with a sense of belonging” (Microsoft, 2016, p. 11). The process involves recognizing exclusion, learning from diversity, solving for one marginalized group, and extending the strategies to many users (Bonitto, 2021; Microsoft, 2016). Finally, usability, or prioritizing feedback from real users, refers to the ease of user interaction and the barriers presented by systems, tools, designs, and products (Nielsen, 1993). Aspects of usability include learnability, efficiency, memorability, errors, and satisfaction (Nielsen, 1993). Quality assurance frameworks like

Quality Matters (2018) leverage *usability* and *accessibility* to emphasize the importance of ensuring that all students can access course content and activities and use them effectively.

## Models of disability

Disability, specifically how people think about disability in higher education, has changed over time (WHO, 2011). Historically, disability was conceptualized in medical terms as an individual's lack of ability to do something due to a health concern (WHO, 2011). This understanding of disability as a problem with an individual is still the dominant model of disability in the United States (Bogart & Dunn, 2019). This led to the institutionalization, segregation, and 'othering' of people with disabilities (Bogart & Dunn, 2019). In higher education, the medical model assumes that disabled students are different from their peers and that a student's diagnosis (e.g., a learning disability) is the reason for their challenges (Ginsberg & Schulte, 2012).

Several laws were passed to prevent discrimination based on disability (Dolmage, 2017). For example, Section 504 of the Rehabilitation Act of 1973 prohibits institutions receiving federal financial assistance from discriminating against people with disabilities (Leuchovius, 2004). Section 508 of the Rehabilitation Act, as amended in 1998, also extends the civil rights to information and communication technology (ICT), which was later aligned with the Web Content Accessibility Guidelines (WCAG). Laws like these have advanced equity and quality of life for disabled people. However, in other ways, they perpetuate the medical model of disability and a compliance mindset (Dolmage, 2017; Shpigelman et al., 2021). Vague language in these laws allows institutions to retrofit courses and spaces only after a student identifies a disability and a barrier (Dolmage, 2017; Shpigleman et al., 2021). As a result, institutions often require students to disclose their disabilities to identify reasonable accommodations for the students' perceived deficits (Kumar & Wideman, 2014; Nieminen & Pesonen, 2020a, 2020b).

Recently, there has been a shift to a social model of disability, which posits that people are disabled by society instead of their body or health condition (WHO, 2011). In this view, disabled students are not disabled by their diagnosis but by learning activities and course environments (Ginsberg & Schulte, 2012). The social model of disability views disabled students' needs on a continuum aligned with the needs of all learners (Ginsberg & Schulte, 2012).

## Disability services and accommodations

Disability Service Offices were established to fulfill legal requirements and promote equity for disabled students (Harris et al., 2019; Shpigelman et al., 2021). They typically provide a range of services and accommodations (e.g., alternative exam formats, study skills, and interpretive services) (De Los Santos et al., 2019; Safer et al., 2020). Following a medical model of disability, though, disabled students typically must share

medical documentation of a disability and their needs to receive accommodations (Cory, 2011; Singleton et al., 2019).

The need for accommodations grew from legislation in the 1990s (e.g., ADA and IDEA). Ketterlin-Geller and Johnstone (2006) defined accommodations as “changes in instruction or assessment practices that reduce the impact of an individual’s disability on his or her interaction with the material” (p. 164). Institutions sometimes struggle to grant accommodations (Cawthon & Cole, 2010; Magnus & Tøssebro, 2014). Budgets, personnel, and other resources often limit accommodations. Further, disabled students typically work with Disabilities Service Offices to create an accommodations plan, but this plan may provide inadequate or incomplete accommodations (Black et al., 2015; De Los Santos et al., 2019). For example, hard-of-hearing students may require a device to amplify sound; however, a medical professional may not know how background noise in a lecture hall could impact a student’s ability to concentrate (Black et al., 2015).

Research also illustrates the problems disabled students face in obtaining accommodations (Harris et al., 2019). First, some students may not identify as disabled and may be reluctant to seek services. For instance, one student with attention deficit disorder stated, “I don’t see myself as a person with a disability, but technically I am” (Friedensen et al., 2021, p. 85). Other students lacking official diagnoses may be required to obtain documentation through testing, evaluation, and medical appointments that can be cost-prohibitive and difficult to obtain (Harris et al., 2019). Students may also struggle to obtain and follow up on accessibility services (Bartz, 2020; Harris et al., 2019). Additionally, disabled students must inform every professor of their needs every semester (De Los Santos et al., 2019; Friedensen et al., 2021). Students often feel uncomfortable having these conversations with instructors they just met (Black et al., 2015; Hong, 2015; Smith et al., 2021). In fact, West et al. (2016) reported how high school students were surprised that they had to self-advocate and potentially educate instructors on their disabilities and needs. Complicating matters further, students commonly report a lack of faculty understanding and awareness of the needs of disabled students (Cook et al., 2009; Harris et al., 2019; Sarrett, 2017; Shpigelman et al., 2021).

Barriers like these are likely why students choose not to disclose their disabilities (Black et al., 2015; Gladhart, 2009; Shpigelman et al., 2021). However, students have also described wanting to avoid pity, embarrassment, stigma, and disclosing personal information (Safer et al., 2020; Shpigelman et al., 2021). Disabled students, like their peers, typically develop their independence and build their identities during college. When they think others perceive their disability in a negative light, it can inhibit them from embracing positive aspects of disability identity and lead to masking or constructing a “publicly performed identity” to obtain accommodations (Shpigelman et al., 2021, p. 9).

## Method

We set forth to explore research on accessible and inclusive online learning and course design in higher education to inform practice and future research. A few literature reviews have been conducted on Universal Design for Learning (e.g.,

Al-Azawei et al., 2016; Fornauf & Erickson, 2020; Rao et al., 2014; Roberts et al., 2011; Seok et al., 2018). However, we aimed to take a broader focus on accessibility and inclusive design in online higher education.

Researchers use different terms when discussing accessible and inclusive online learning, which makes it difficult to identify one unified body of literature. To identify literature for this review, the first author first searched the Education Resources Information Center (ERIC) and Google Scholar using the keywords “Universal Design for Learning,” “UDL,” “course design,” “instructional design,” “higher education,” or “postsecondary,” “online,” “e-learning,” “faculty,” “instructor,” “professor,” “students with disabilities.” The strings “Universal design” OR “UDL” + “course design” or “instructional design” as well as “inclusive” + “higher education” + “online” were the most successful in identifying relevant studies ( $n = 59$ ).

Identified articles were added to a spreadsheet with basic information, including the search term used, the authors, year, title, population (faculty, IDs, disability support, students, or other), journal, exclusion criteria, and abstract. A preliminary screening process was used to remove duplicates and determine if the articles met the following inclusion criteria: being peer-reviewed, published between 2002 and 2022, focused on accessible and inclusive online learning in higher education, and written in English. Additional strategies were used to identify articles (see Randolph, 2009), such as searching the references for other relevant studies ( $n = 24$ ), identifying known literature from previous work on accessible and inclusive online learning ( $n = 28$ ), and collecting references from colleagues ( $n = 23$ ). Empirical articles were scarce due to the nascent state of research in this area (Rao et al., 2014). Given this, we also reviewed non-empirical practice briefs and gray literature to provide a broader body of literature to review. Once articles were identified as meeting the inclusion criteria, a spreadsheet was used to compile data. Ultimately, 91 sources were included in this literature review. Figure 1 illustrates the process.

Articles were found in a mix of disability-focused journals (e.g., 12 from the *Journal of Postsecondary Education and Disability*), online learning research journals (e.g., five from *Online Learning*, four from the *International Review of Research in Open and Distributed Learning (IRRODL)*, three from *Distance Education*), instructional design journals (e.g., five from *Journal of Applied Instructional Design*) and educational technology journals (e.g., four from *Tech Trends*).

## Results

After reviewing and analyzing the research, we found three main themes—namely, barriers to learning online, frameworks for accessible and inclusive online learning, and responsibility for creating accessible and inclusive online courses—emerged from the literature (see Table 1). In the following sections, we discuss these themes in more detail.

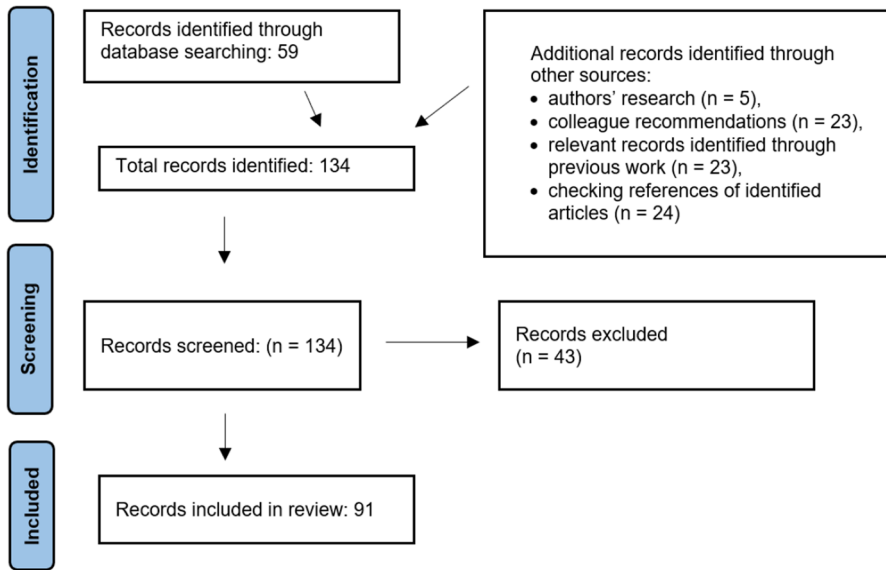


Fig. 1 The identification methods of the sources included in this literature review

**Theme 1: barriers to learning online**

Despite the growth of online learning and the growing emphasis on accessibility, inclusion, and usability, research suggests that some students struggle to learn online more than others (Coombs, 2010). For instance, some students lack the self-directedness and/or communication and technical skills required to be successful online (Lowenthal et al., 2018, 2021; Kent, 2016). While disabled students face many of the same challenges as their peers transitioning and adapting to higher education,

**Table 1** Themes and Sub-themes

Theme	Description
<i>Theme 1</i>	<i>Barriers to learning online</i>
1.1	Lack of self-directedness and communication
1.2	Inaccessible content
1.3	Singular means of demonstrating knowledge
1.4	Timing issues
1.5	Additional barriers
<i>Theme 2</i>	<i>Frameworks for accessible and inclusive online learning</i>
2.1	Universal design for learning
2.2	Other emerging equitable course design frameworks
<i>Theme 3</i>	<i>Responsibility for creating accessible and inclusive online courses</i>
3.1	Faculty
3.2	Instructional designers

specifically, online learning, they often face additional barriers to learning online (Bartz, 2020; Gladhart, 2009; Shpigelman et al., 2021). While these barriers were always prevalent (see Linder et al., 2015), the COVID-19 pandemic exposed them and other accessibility challenges for disabled students on a larger scale.

### **Subtheme 1.1: lack of self-directedness and communication**

There is no such thing as an ideal online learner. However, when online enrollments grew during the 2000s, online educators increasingly investigated the qualities of successful online learners (Dray et al., 2011; Martin et al., 2020). Two qualities still discussed today are the importance of being self-directed (Doe et al., 2017; Martin et al., 2020) and communicating online successfully (Hung et al., 2010; Martin et al., 2020). These are two areas where students with specific disabilities might struggle more than others.

First, being self-directed and able to manage one's own time and learning can be difficult for any student, especially for students used to having teachers and paraprofessionals guide and support them through K12 education. Further, many disabled students also experience difficulties with executive functioning skills or the ability to manage varying resources to set appropriate goals and create effective strategies to work towards the goals (Meyer et al., 2014). Disorganized online learning materials and confusing course navigation may create additional barriers for students who already find executive functioning difficult (Bartz, 2020; Cai & Richdale, 2016; also see Lister et al., 2021). Changes to structures or routines (e.g., discussions or assignments due on different days or at different times) can be especially difficult for autistic students (Cai & Richdale, 2016).

Instructors often do not know when online students struggle partly because body language and facial expressions are absent. The onus is on students to communicate their difficulties. However, research suggests that disabled students might not have the communication skills, specifically digital literacy skills, needed to communicate successfully and interact with instructors and peers online (Lowenthal & Dunlap, 2018). For instance, some autistic students with social-communication difficulties may not feel comfortable asking for assistance or participating in online courses that require social interaction (e.g., group work, discussions, or peer reviews; Cai & Richdale, 2016). Likewise, Deaf and hard-of-hearing students report difficulties communicating with peers and faculty, especially in synchronous courses where they might not have an interpreter or accurate captions (Kent, 2016).

### **Sub-theme 1.2: inaccessible content**

Perhaps the biggest barrier to learning online is inaccessible content (Coombs, 2010). Inaccessible content can include multimedia that lacks accurate captions and transcripts, learning management systems or documents that are not designed for usability and compatibility with assistive technologies (e.g., screen readers), visual representations that lack alternative formats, content with poor color contrast, and systems or materials that prevent personalization. Issues like these can significantly halt a disabled student's progress (Bartz, 2020; Fichten et al., 2009). For instance,

if a recorded lecture lacks accurate captions or transcripts or a synchronous session relies on subpar computer-generated captions, a Deaf or hard-of-hearing student may be missing key information (Anderson, 2020). Even when multimedia contains accurate captions, some students with vision issues may still miss important information presented on the screen but not orally described (Covadonga & Tabuenca, 2020). Another potential barrier with online multimedia and images is poor color contrast. Specific color combinations can pose difficulties for students with low vision or color blindness. For instance, if a bar graph distinguishes between elements solely by color and does not provide an adequate description, students may be unable to interpret the data effectively.

Students should be able to customize their learning materials to suit their accessibility needs and preferences. For multimedia, students need the ability to control the volume, speed, the option to pause/stop the video, and subtitle/captioning controls to effectively comprehend the content (Covadonga & Tabuenca, 2020). Likewise, learning management systems (LMSs) or documents (e.g., scanned PDFs presenting text as an image) often restrict students' ability to adjust text size, colors, and font, which in turn may prevent students from using assistive technology from accessing and using the information effectively (Covadonga & Tabuenca, 2020). In the pivot to remote learning in 2020, students reported an increase in inaccessible documents, including scanned PDFs that present text as an image (Anderson, 2020). Online courses also need to be designed to allow students to navigate without a mouse or with voice commands. Some students with mobility difficulties prefer to use speech-to-text software to assist in writing papers or class discussions. When online courses require significant writing, it can cause students fatigue and pain (Kent, 2016).

Studies have shown that disabled students struggle to access timely instructional materials and assistive technology (Linder et al., 2015). When disabled students report issues with online learning, they commonly remain unsolved or are solved with a non-learning solution, such as a family member reading inaccessible materials aloud (Fichten et al., 2009). Relying on others inhibits students from becoming independent learners.

### **Sub-theme 1.3: singular means of demonstrating knowledge**

Preferences vary from person to person and are greatly affected by different disabilities and situations. For instance, in one study, autistic students preferred assessments that require less interpersonal interaction (e.g., recorded presentations without a live classroom audience) (Satterfield et al., 2015). In contrast, in another study, some autistic students struggled to articulate their thoughts in writing, while others struggled with spoken assessments (Cai & Richdale, 2016). However, in both studies, students cited how flexibility helped reduce their anxiety (Cai & Richdale, 2016; also see Satterfield et al., 2015).

Disabled students are often attracted to online learning because they can learn at their own pace and take extra time when needed (Kent, 2016). However, timed exams and synchronous sessions can challenge students who face varying and often unpredictable symptoms that disrupt learning. For instance, a student with an acquired brain injury might struggle to focus and concentrate (Kent, 2016). If these

symptoms arise during a timed exam or scheduled online class meeting time, students may be unable to complete the exam or participate in the class.

#### **Sub-theme 1.4: timing issues**

Disabled students often report slower academic processes that prevent them from keeping up with their peers (Bartz, 2020; Kent, 2016). For example, in one study, a student with a visual and learning disability reported the need to arrive on campus early and spend extra time reading to process information; then another student with a visual disability reported the need to rely on staff to conduct research, limiting their ability to be independent learners (Black et al., 2015). Students with mobility, learning, or speech issues might struggle to actively participate in synchronous group chats because they need more time to respond (Burgstahler et al., 2004; Coombs, 2010). Likewise, autistic students who experience social-communication difficulties may struggle to participate in group work (Cai & Richdale, 2016). When an accommodation cannot be met, disabled students are sometimes instructed to take the class at another time, further delaying their progress towards graduation (Bartz, 2020; Friedensen et al., 2021).

#### **Sub-theme 1.5: additional barriers**

There are other barriers disabled students might face regardless of modality—such as additional personal responsibilities, ambivalent or negative attitudes, and physical barriers (Tobin & Behling, 2018). Disabled students often face what Bartz (2020) terms “barriers in the heads of other people” (p. 11), where people question why they would even pursue higher education. Disabled students may also face discrimination from peers, professors, and other administrators (Ginsberg & Schulte, 2012; Shpigelman et al., 2021). This discrimination can challenge students who are trying to develop a positive self-identity that includes being disabled (Sarrett, 2017).

### **Theme 2: frameworks for accessible and inclusive online learning**

Despite decades of interest, higher education has only recently begun to focus on accessibility and inclusion (Seale, 2006, 2020; Seale et al., 2020). The following section will describe frameworks used to create accessible and inclusive instruction.

#### **Sub-theme 2.1: universal design for learning**

*Universal Design* (UD) began in the 1950s as an architectural framework for removing barriers for people with disabilities (Roberts et al., 2011). In the 1970s, coinciding with civil rights legislation, UD evolved to make physical spaces usable for the greatest number of people (CAST, 2022a; Kumar & Wideman, 2014). For instance, curb cuts benefit not only wheelchair users but also those with strollers, luggage, shopping carts, bicycles, and more (Kumar & Wideman, 2014). People began to question how similar approaches could be used in education.

Three prominent adaptations of UD emerged in education: Universal Instructional Design (UID), Universal Design for Instruction (UDI), and Universal Design for Learning (UDL) (Roberts et al., 2011; Wynants & Dennis, 2017). Researchers sometimes use the terms interchangeably (Wynants & Dennis, 2017), while others differentiate between them (Singleton et al., 2019). UID focuses on building common accommodations for disabled students (e.g., extended time for exams, lecture notes, etc.) from the start (Singleton et al., 2019). UDI, as developed by McGuire et al. (2003), translated the seven UD principles for architecture (i.e., equitable use, flexibility in use, simple and intuitive, perceptible information, tolerance for error, low physical effort, and size and space for approach and use) into the educational realm and added two additional principles focused on student engagement (i.e., community of learners and instructional climate). UDI, though, has been criticized for focusing solely on instruction instead of the broader learning process (Dolmage, 2017). UDL, on the other hand, is sometimes seen as an all-encompassing framework that leverages UID, UDI, and accessibility while offering greater flexibility (Singleton et al., 2019).

The UDL framework, developed by the Center for Applied Special Technology (CAST, 2022b), is predicated on an intentional, proactive design that considers learner variability while reducing barriers in course design (Evmenova, 2021; Rao, 2021). When learner variability is understood as typical, it can be intentionally addressed through flexible course design and intentional scaffolds (Rao & Meo, 2016). The UDL framework, building on advances in brain research and technology, was conceptualized as consisting “of three overarching operative principles, each formed to minimize barriers and maximize learning through flexibility” (Rose & Meyer, 2002, p. 74)—namely, the importance to provide multiple means of engagement, multiple means of representation, and multiple means of action and expression.

## Research on universal design for learning

Despite the interest in UDL (including multiple books), there is little empirical research on UDL. Over the years, some research has focused on students’ perceptions of courses designed with UDL (Black et al., 2015; Kumar & Wideman, 2014; Levicky-Townley et al., 2021; Oyarzun et al., 2021). Black et al. (2015) interviewed twelve disabled students and three without disabilities in a technology-enhanced face-to-face course designed with UDL principles. The results indicated that students perceived an increased sense of control over their learning, which led to reduced stress and improved flexibility. The content provided in multiple forms led to a reduction in the need for formalized accommodations.

In another study, Nieminen and Pesonen (2020a, 2020b) described the experiences of disabled students in a large enrollment 7-week undergraduate mathematics course in Finland that could be completed online. The course was designed using UDL and Universal Design for Assessment (UDA) in mind. The disabled students noted benefitting from the clear organization of the content, the self-assessments built to monitor their learning and progress, detailed rubrics, and the plain language

used throughout the course. The results also highlighted the heterogeneity of disabled students' experiences. For instance, the course's online components supported one participant's organization and executive functioning skills. At the same time, it caused difficulty for two others—one who preferred print materials and one who was overwhelmed by the complexity of digital submissions. All three students noted that they studied alone despite the design of social interaction.

Another line of research has focused on faculty knowledge of UDL and perceptions of the challenges and opportunities of adopting UDL (Gladhart, 2009; Hartsoe & Barclay, 2017; Izzo et al., 2008; Oyarzun et al., 2021). For instance, Gladhart (2009) found that most online faculty had disabled students in their courses, but only 13.8% of participants were aware of and had implemented UDL in their online courses. More recently, Oyarzun et al. (2021) identified barriers to implementing UDL principles in online learning, including competing priorities, technological barriers, lack of leadership support, and a lack of time. They found that faculty were motivated to incorporate UDL when they believed it would improve student engagement and when they understood how UDL aligns with best practices for teaching and learning. They also found that faculty valued professional development about UDL, specifically the application to online environments.

Other lines of inquiry have focused on the impact of UDL-related faculty development training (Davies et al., 2013; Levicky-Townley et al., 2021). For instance, Levicky-Townley et al. (2021) found that incorporating UDL into online learning activities helped support students' attention, reduce distraction, increase the relevance of the content, and shift students' beliefs about the content topic. Other studies describe the development of a course designed with UDL in mind. For instance, Evmenova (2021) emphasized the systematic and iterative proactive design process used to create an online graduate course about UDL for in-service teachers. Evmenova (2021) used a mixed-methods study to explore in-service teachers' interactions with UDL components, recognition of UDL components, and perceptions of the importance of designing with UDL in mind. Results demonstrated that participants used and appreciated the multiple means of engagement, representations, and action/expression. Rao (2021) described how to apply the UDL Design Cycle (Rao & Meo, 2016) to online learning experiences, including the importance of reporting how UDL was used in the design and any impact it may have had on student outcomes. Research of this kind intends to translate the broad UDL principles into a more systematic instructional design process.

Finally, to a lesser extent, some researchers have focused on instructional designers' perceptions of UDL (Singleton et al., 2019; Xie et al., 2021b). This research, which will be discussed later in greater detail, suggests that instructional designers have varying levels of commitment to and knowledge about UDL and are limited by a lack of agency and ownership over online courses (Singleton et al., 2019). Recent research has found that advocating for accessible online course design may cause tension between faculty and instructional designers due to faculty's misconceptions about disability and resistance to changing teaching methods (Xie et al., 2021a). Research suggests that the COVID-19 pandemic shifted instructional designers' roles from meeting legal and standard minimums to more advocacy for intentional, proactive multimodal design strategies, including UDL.

## Critiques of universal design for learning

As with any framework, UDL is not without its critiques. UDL is sometimes criticized for overselling the positive outcomes without empirical evidence of its effectiveness (Boysen, 2021). Research on UDL, as mentioned above, is limited. This is partly due to varying definitions and implementations of UDL (Fornauf & Erickson, 2020). Common critiques focus on workload and the lack of time and resources available (Lowenthal & Lomellini, 2022; Oyarzun et al., 2021; Singleton et al., 2019). For instance, some see UDL as calling for instructors to tailor content to individuals almost as a form of personalized learning (Boysen, 2021). Others see UDL as requiring instructors and designers to provide all content in multiple formats (Boysen, 2021). Some also believe that more experimental design research is needed to demonstrate that UDL increases student learning outcomes (Boysen, 2021; Roberts et al., 2011). Boysen (2021), in particular, argues that research should demonstrate how UDL increases learning more effectively than other standard teaching practices (e.g., active learning).

### Sub-theme 2.2: other emerging equitable course design frameworks

Universal Design for Learning (UDL) is not the only framework focused on promoting equitable, accessible, and inclusive online learning. While UDL plays a crucial role, particularly in emphasizing accessibility for all learners, it does not focus exclusively on online education. Rather, UDL provides a broad framework applicable across various educational settings to ensure that education, in any format, is accessible to all learners. Additionally, UDL principles significantly overlap with established good teaching practices (Rogers & Gronseth, 2021; Schelly et al., 2011; Wynants & Dennis, 2017). For example, UDL checkpoint 8.3, which emphasizes “fostering collaboration and community,” shares similar objectives with the Community of Inquiry framework, a model focused on creating rich, interactive learning experiences through social, cognitive, and teaching presence (Rogers & Gronseth, 2021). UDL has also been linked to active learning strategies, as both promote student-centered and interactive course designs (Rogers & Gronseth, 2021).

In recent years, researchers and educators have begun integrating UDL with other frameworks, particularly those that emphasize diversity, equity, and inclusion (DEI) or the broader concept of quality in online learning. This blending of UDL with other design frameworks often helps educators tackle a wider range of issues, from accessibility to creating inclusive environments that reflect DEI values. For example, Gamrat (2022) discussed the concept of “Inclusive ADDIE,” a DEI-focused adaptation emphasizing inclusivity throughout the instructional design process.

Beyond UDL, there are numerous frameworks and standards designed to assist educators in creating quality online courses. Over the last decade, dozens of such frameworks have emerged to guide educators in developing robust, learner-centered online environments (Baldwin et al., 2018; Baldwin & Trespacios, 2017; Lowenthal & Davidson-Shivers, 2019). Notable examples include Quality Matters (QM) and the Open SUNY Course Quality Review Rubric (OSCQR). While not all of these frameworks focus specifically on accessibility, many have begun incorporating

accessibility principles to varying degrees. For instance, Baldwin and Ching (2021) highlight how some of these rubrics, such as QM and OSCQR, include accessibility as part of their course quality criteria. In a previous study, Baldwin and Ching (2019) even found that 25 out of the 33 criteria in the Canvas Course Evaluation Checklist (CCEC) referenced UDL guidelines. The Illinois Online Networks' Quality Online Course Initiative (QOCI) also encouraged designing a multitude of ways for learners to demonstrate knowledge, a key UDL principle (Baldwin et al., 2018). Lowenthal et al. (2021) analyzed thirteen quality rubrics and found that the Open SUNY Course Quality Review Rubric (OSCQR) was the most comprehensive rubric, in terms of accessibility. OSCQR was also the only quality assurance rubric to incorporate accessibility throughout the framework instead of in one dedicated section (Lowenthal et al., 2021). This mirrors Singleton et al.'s (2019) recommendation to incorporate accessibility-related content into all aspects of faculty development initiatives instead of tacking it on at the end of the course design process. While using quality rubrics grounded in UDL might help spread awareness, researchers caution course designers from viewing accessibility or UDL as a means of compliance or with a check-box mentality that reduces the complexity of the design process (Lowenthal et al., 2021).

Instead, educators are encouraged to engage deeply with UDL and other equitable design frameworks, ensuring they are thoughtfully applied to meet the diverse needs of learners in an evolving online education landscape.

### **Theme 3: responsibility for creating accessible and inclusive online courses**

As online learning grows and faculty encounter a more diverse student body, faculty are slowly becoming more knowledgeable about the importance of accessible and inclusive online courses. However, a recurring question in the literature is about who is responsible for creating accessible and inclusive online courses (Linder et al., 2015).

#### **Sub-theme 3.1: faculty**

Faculty are hired as subject matter experts. Many, if not most, have never taken formal coursework on teaching (Izzo et al., 2008; Linder et al., 2015). Even faculty with some formal or informal pedagogical training might have little experience designing online courses and often have limited to no experience designing accessible and inclusive online courses (Izzo et al., 2008; Linder et al., 2015).

Research shows that faculty who align with the social model of disability were more likely to engage with disabled students to find collaborative ways to meet their needs, regardless of disability or medical documentation (Ginsberg & Schulte, 2012; Nieminen & Pesonen, 2020a, 2020b). Faculty who aligned with the medical model of disability tended to support offering accommodations only to students with appropriate documentation and felt that too many accommodations could be unfair to other students (Ginsberg & Schulte, 2012; Harris et al., 2019).

*Faculty Knowledge and Attitudes.* Faculty report varying knowledge and perceptions of accommodations and inclusive design strategies in higher education (Oyarzun et al., 2021). Faculty tend to have limited knowledge of laws, institutional services, and effective instructional practices for disabled students (Singleton et al., 2019; West et al., 2016). However, research also shows that more exposure and awareness of training can improve faculty's confidence and willingness to create inclusive learning spaces (West et al., 2016).

One common strategy to assess faculty attitudes is administering the Inclusive Teaching Strategies Inventory (ITSI) (Hartsoe & Barclay, 2017; Lombardi et al., 2011; West et al., 2016). The ITSI includes 31 items that measure six constructs, including (1) Multiple Means of Presentation, (2) Inclusive Lecture Strategies, (3) Accommodations, (4) Campus Resources, (5) Inclusive Assessment, and (6) Accessible Course Materials (Lombardi et al., 2011). The ITSI is intended to evaluate both attitudes and actions related to UD strategies. Research using this instrument has shown that women and faculty teaching in an Education Department typically report more confidence and knowledge related to UD (Dallas et al., 2014; Izzo et al., 2008). Researchers posit that education faculty may have more UD-related training due to the legal requirements in K12 teaching. These faculty are also trained in quality pedagogy and may have interacted more with disabled students in the K12 environments (Izzo et al., 2008). Additionally, research indicated that faculty have positive attitudes toward inclusive instructional practices but do not always implement such practices in their teaching (Lombardi et al., 2011). Research leveraging the ITSI also revealed that some faculty think accommodations (e.g., providing presentations, notes, extended time, and alternative exam formats) compromise a course's rigor (Lombardi et al., 2011).

Research suggests that faculty development efforts must address the underlying perceptions of disabled students before addressing UD (Ginsberg & Schulte, 2012). Aligning course design with the social model of disability and social constructivism can provide a solid foundation for the empathy and flexibility that is needed to improve quality, accessibility, and learning outcomes for all learners, including those with disabilities (Ginsberg & Schulte, 2012; Rogers & Gronseth, 2021).

*Faculty Training and Implementation.* Research has found that accessibility training for faculty varies across institution types (Garrett et al., 2021; Xie & Rice, 2021). Garrett et al. (2021) posited that these differences are likely due to four-year institutions having more assistance from instructional designers and third parties to reduce the need for faculty accessibility training (Garrett et al., 2021). However, the extent of instructional designers' knowledge and skills in accessibility and inclusive design remains to be examined thoroughly in the literature.

Research shows that while most faculty support accessible and inclusive design and teaching strategies, intentions do not always translate into action (Dallas et al., 2014; Lombardi et al., 2011; Rao & Tanners, 2011; Schelly et al., 2011; Shpigelman et al., 2021; Singleton et al., 2019). One theory is that there is confusion over what a UDL or inclusive teaching/design strategy entails (Gladhart, 2009; Izzo et al., 2008; Singleton et al., 2019).

However, familiarity and implementation of inclusive design strategies have grown recently (Linder et al., 2015). In one study, Linder et al. (2015) found that

some form of UDL training occurred at 13 of the 20 campuses interviewed. Training may vary from just-in-time resources to individual consultations with DSO staff or instructional designers, one-time workshops, and courses about inclusive design strategies (Linder et al., 2015). The result is that most online faculty involved in course design are familiar with at least one UDL guideline (Westine et al., 2019).

In another study, Westine et al. (2019) found that faculty were most familiar with comprehension, expression, and communication guidelines and least familiar with strategies for physical action, language, and support. They also found a moderate to high interest in learning more about UDL, especially strategies related to sustaining effort and persistence, comprehension, expression, and communication (Westine et al., 2019). This aligns with other research showing that faculty are interested in inclusive design but require training to implement UD-related strategies effectively (Izzo et al., 2008). Westine et al. (2019) also found that most faculty familiar with UDL reported a high to moderate level of implementation as well.

Research shows that even a few hours of training on accessible and inclusive design strategies can result in faculty implementing some strategies in their courses (Dallas et al., 2014; Schelly et al., 2011; Wynants & Dennis, 2017). For instance, Wynants and Dennis (2017) created an online disability awareness program in collaboration with faculty, the faculty development center, and the DSO to help faculty understand the needs of disabled students and how to integrate the principles of UDI into their courses. Pre- and post-training surveys revealed less discomfort in interacting with disabled students, an increase in knowledge of disabled students and UDI principles, and an increase in confidence and willingness to apply UDI principles. This aligns with earlier research demonstrating faculty's self-assessed increase in UDL knowledge after training (Izzo et al., 2008). In addition, the faculty learned to recognize the usefulness of UDI and how the integration of inclusive design strategies can benefit all learners. In fact, most of the faculty ended up making their courses more accessible. The results align with the idea that faculty are eager to address issues of accessibility and inclusivity but may feel overwhelmed due to a lack of knowledge (Linder et al., 2015; Singleton et al., 2019).

In another study, faculty received UDL training tailored to the faculty and students' perceived gaps in UDL knowledge and skills. After the training, students reported significant changes in presenting content in multiple formats and summarizing key concepts before and after instruction (Schelly et al., 2011). When faculty summarize information, it provides multiple means of representation and can engage students in learning, both important aspects of UDL (Schelly et al., 2011).

In a follow-up study, Davies et al. (2013) improved on the research design of Schelly et al. (2011) to measure the effectiveness of UDL training by including a control group. The results demonstrated that UDL training for faculty significantly impacted students' perceptions of instruction. Students perceived that faculty who were trained in UDL presented materials in multiple formats, aligned key concepts to the course objectives, provided outlines, summarized materials, used videos, and used organized and accessible materials. The results also highlighted the impact of positive student-faculty interactions on student engagement and achievement. The researchers emphasized that UDL strategies are mainly dependent on effective communication.

### Sub-theme 3.2: instructional designers

While inclusive design initiatives—and related research—often originate from DSOs, instructional designers are also well-positioned to advocate for equitable course design strategies (Tobin & Behling, 2018).

*Evolving instructional designer competencies.* What started with a narrow focus on media and designing instruction has blossomed into a multifaceted role that leverages technology during systematic design processes to improve learning (Klein & Kelly, 2018). Over the years, researchers have focused on creating and/or identifying instructional designer competencies to highlight what instructional designers need to know and be able to do (Klein & Kelly, 2018). For example, the International Board of Standards for Training, Performance, and Instruction (IBSTPI) outlined 22 competencies for instructional designers that fall into the domains of professional foundations, planning and analysis, design and development, evaluation and implementation, and management (IBSTPI, 2012). One competency under the Professional Foundations domain encourages practitioners to respond to ethical, legal, and political design implications (IBSTPI, 2012), which may be extrapolated to include inclusive design.

The Association for Talent Development (ATD) began research in 1978 on the competencies of training and development professionals (North et al., 2021). ATD's Talent Development Capability Model contains 23 capabilities in three categories of building personal capability, developing professional capability, and impacting organizational capability (ATD, 2022a). ATD's model emphasizes the importance of integrating diversity and inclusion principles (ATD, 2022b) while leveraging cognitive sciences and strategies for increasing motivation (ATD, 2022c), which are foundational to UDL.

Despite mentions of inclusive design strategies in professional organizations' models of ID competencies and capabilities, we contend that research often overlooks the instructional designers' roles and responsibilities regarding accessible and inclusive course design. For instance, a mixed-methods study on employers' perceptions of ID competencies did not mention accessibility or inclusive design (Klein & Kelly, 2018). Likewise, other work defining the roles and competencies of IDs has not focused on or identified accessibility skills and knowledge of inclusive design strategies (Kumar & Ritzhaupt, 2017; Ritzhaupt et al., 2021).

Only a few studies mention accessibility-related competencies for instructional designers. An analysis of job postings and survey data from educational technologists focusing explicitly on multimedia competencies briefly noted knowledge of accessibility software (e.g., JAWS); however, it was one of the lowest-rated competencies (Ritzhaupt et al., 2010). Ritzhaupt et al. (2010) also found that accessibility knowledge (e.g., Sect. 508) was mentioned in only 6.83% of job postings. Likewise, another analysis of 400 job announcements found limited mention of accessibility software and accessibility knowledge in general (Kang & Ritzhaupt, 2015). Park and Luo (2017) proposed a more recent refined ID competency model specifically tailored to the context of online higher education. Their model, based on research at one institution, mentioned analyzing diverse learners' needs and assessing and remediating courses for accessibility as performance statements

under the planning and analysis domain (Park & Luo, 2017). These findings illustrate a gap in the literature and an opportunity for instructional designers to lead change in higher education by advocating for and implementing accessible and inclusive online design strategies.

While there is limited information about IDs' accessibility and inclusive design-related competencies, researchers agree that effective collaboration, superb communication, and the ability to facilitate innovations in teaching and learning are core competencies (Kang & Ritzhaupt, 2015; Klein & Kelly, 2018; North et al., 2021; Ritzhaupt et al., 2021). In addition, scholars suggest that implementing, managing, and leading change is critical to IDs' roles in higher education (Ritzhaupt et al., 2021). In that vein, we posit that instructional designers are well-positioned to respond to the call to meet the needs of faculty and diverse learners through inclusive design strategies; however, research shows that IDs have varying levels of knowledge and experience designing for diverse learners. This presents an opportunity for instructional designer preparatory programs to develop curricula to address the gap in IDs' knowledge and skills related to accessible and inclusive design.

*IDs' perspectives and implementation of inclusive design.* Research into IDs' perspectives and implementation of inclusive design strategies in the online course development process is limited. Much of the research includes practice briefs and case studies (Dinmore, 2019; Evmenova, 2021; Rao, 2021), experiences of faculty course designers (Oyarzun et al., 2021; Rao & Tanners, 2011), and position papers (Gronseth, 2018).

Only one qualitative case study identified specifically focused on instructional designers' perspectives about the integration of UDL and faculty perceptions of UDL (Singleton et al., 2019). The data revealed that instructional designers work hard to create a trusting relationship with faculty. The IDs noted that faculty were overwhelmed by their ever-increasing responsibilities, lack of experience teaching online, and lack of technical skills. These were seen as barriers impacting faculty adoption of UDL.

In addition, research suggests that faculty can resist changing their approach to the accommodation process (Singleton et al., 2019). As a result, some IDs feel that advocating for UDL strategies could jeopardize their relationship with faculty. In Singleton et al. (2019), IDs describe how terms like *UDL* and *accessibility* scare away faculty. The IDs in that study also expressed an institutional resistance to online course development. They purported that faculty believe students should learn the way the faculty were taught (i.e., face-to-face lectures). IDs themselves were found to have varying levels of commitment to UDL implementation and knowledge of UDL principles. IDs mentioned an inability to enforce inclusive design practices and a lack of administrative enforcement. This is consistent with the call for more institutional support for inclusive design strategies (Burgstahler, 2006; Gladhart, 2009; Linder et al., 2015; Tobin & Behling, 2018).

Researchers also suggest reframing UDL in terms of improving student success, learning outcomes, and teaching evaluations as opposed to disability-focused language. This is consistent with suggested approaches by other researchers (Tobin & Behling, 2018). While additional research needs to be conducted, there is limited

data that online courses do not fully utilize the available accessibility features of learning management systems (Elias, 2010).

## Conclusion

Increasing online enrollments presents a challenge—but also an opportunity—to reexamine online course design to ensure that it meets the needs of all learners, including disabled students (Fichten et al., 2009; Kent, 2016; Roberts et al., 2011; Satterfield et al., 2015). However, fully supporting disabled students in online higher education will require a shift from a medical mindset to a social model of disability (Dolmage, 2017; Ginsberg & Schulte, 2012; Tobin & Behling, 2018). This shift will require a collaborative effort from all parties involved, including students, faculty, instructional design teams, and institutions.

This shift would acknowledge the dynamic nature of disability across interactions, celebrate diversity, and embrace difference as the norm (Ginsberg & Schulte, 2012). To move in this direction, institutions need to anticipate learner variability and proactively create accessible and inclusive online courses (Meyer et al., 2014).

Research suggests that buy-in from leadership, faculty, and instructional designers is essential to facilitate this needed cultural shift (Burgstahler, 2006; Gladhart, 2009; Linder et al., 2015). Many institutions have no designated point person for online accessibility; rather, responsibilities are split among different offices (Linder et al., 2015). This confusion adds to the frustration expressed by students, faculty, and instructional designers about where to turn for support and assistance (Izzo et al., 2008). Research indicates a need for institutional policies and procedures to help ensure support and clear guidance (Gladhart, 2009; Izzo et al., 2008; Linder et al., 2015; Tobin & Behling, 2018). More recently during the COVID-19 pandemic and the rapid shift to remote learning, technology enhancements became a priority, leaving digital accessibility often overlooked (Anderson, 2020; Garrett et al., 2021). Researchers and practitioners call for adequate training and ongoing support for faculty and course designers in inclusive design strategies (Tobin & Behling, 2018). Resources and training have been proven to help increase faculty and instructional designers' awareness and skills (Dallas et al., 2014; Izzo et al., 2008; Lombardi et al., 2011; Schelly et al., 2011; Wynants & Dennis, 2017). However, the delegation of responsibility remains a persistent barrier (Linder et al., 2015). Preliminary research demonstrates that instructional designers have the technical skills and emerging knowledge to collaborate with faculty to create inclusive learning experiences (Lomellini & Lowenthal, 2022).

Despite the rise in the prevalence of instructional designers in higher education (Larson & Lockee, 2014), there is a gap in the literature about accessible and inclusive online course design from the instructional designer's perspective (Singleton et al., 2019). Instructional designers are in a unique position to lead the charge of incorporating accessible and inclusive design strategies in online higher education and garnering faculty and administrative buy-in. Further research needs to explore the degree to which instructional designers are prepared for this challenge. Other research should focus on the following:

- Developing consistent descriptions of UDL in practice (see Fornauf & Erickson, 2020)
- Investigating perspectives of disabled scholars and students (Dolmage, 2017)
- Clarifying roles and responsibilities of IDs and leaders (Linder et al., 2015; Singleton et al., 2019)

## Declarations

**Conflict of interest** The authors declare that they have no conflict of interest.

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