

# Tips for Designing an Accessible and Inclusive Online Course

Sheryl BURGSTAHLER

Accessible Technology Services  
University of Washington, Box 354842  
Seattle, USA 98195, USA

## ABSTRACT

In this paper I tell how a universal design in education (UDE) framework can be used by instructors interested in ensuring that their formal and informal online learning activities are accessible to and inclusive of all potential students, including those with disabilities. Applying the principles that underpin UDE I will share tips for getting started in creating and delivering an online course that is accessible and inclusive. The tips are informed by experiences of students with disabilities, online instructors, course designers, and IT accessibility experts presented in the literature and conference presentations, as well as my personal experiences as an online instructor since 1993. The topic of this paper is particularly relevant because of the conversion of thousands of on-site courses to online formats in response to the COVID-19 pandemic, legal mandates for making courses accessible to students with disabilities, and heightened interest nationwide in addressing diversity, equity, and inclusion issues.

**Keywords:** disability, universal design, accessible design, accessibility, usable, online learning, distance learning.

## INTRODUCTION

In 1993 I co-taught the first fully online course offered by the University of Washington. Dr. Norm Coombs, a professor at the Rochester Institute of Technology, was my co-instructor. The course was about adaptive computer technology for individuals with disabilities. We needed to design the course to be accessible to Norm, who is blind and uses a screen reader and speech synthesizer to read text presented on the screen. We also made sure our course was accessible to students with disabilities that impact their abilities to hear, use their hands, and learn. We employed tools commonly available at the time—email, a discussion list, file transfer protocol, and telnet. The World Wide Web was not used by the general public at that time, but Gopher, developed at the University of Minnesota, was a tool that allowed us to organize all of our text-based course materials. Video presentations—with captions and audio descriptions and stored on VHS tapes—were sent to the students by postal mail. We did not know how many of our students had disabilities because no one needed to disclose a disability because all of the course materials and teaching methods were designed to be accessible to everyone.

Today, technologies used to deliver courses online or online components of hybrid courses are more advanced and diverse with respect to their capabilities than they were in 1993. However, the basic issues are the same when it comes to accessibility. As they choose content, document formats, and teaching methods, it is important for instructors to remember that potential students have a wide variety of characteristics, including those that relate to gender, race, ethnicity, culture, age, sensory abilities,

communication skills, learning abilities, interests, physical abilities, social skills, values, learning preferences, and socioeconomic status.



Figure 1 A student who is blind engages in an online course using a screen reader. Source: DO-IT, [uw.edu/doi/line-drawings-and-images](http://uw.edu/doi/line-drawings-and-images)

Even with good intentions, many online instructors present access challenges for students with disabilities that impact sight, hearing, mobility, learning, attention levels, social interactions, and health. For example, we need to make sure that the screen readers of students who are blind (as illustrated in figure 1) can access the curriculum; this means that content must be presented as text or, if included within an image, an alternative text description must accompany it. To make materials easy to read for screen reader users it is also important that they be structured; for example, the creator must format hierarchical headings and subheadings, lists, and tables using the features within the software with which a document is created. Using text-based documents is also important for students who have reading-related disabilities and use text-to-speech software to read aloud text on the screen so that they can view and hear words at the same time. It is also good to know that students who cannot operate a standard keyboard are likely to be using assistive technology that can fully emulate the keyboard but not the mouse (as illustrated in figures 2 and 3). Therefore, website and other IT creators need to be sure that their products can be accessed and navigated with the keyboard alone. For students who are deaf or hard of hearing or are English language learners it is important that videos are captioned. For all students, but particularly for students who have attention deficits, are on the autism spectrum, or have certain types of learning disabilities, it is important that content is presented in clear, consistent formats and that instructions are complete and easy to follow.

Unfortunately, using an accommodation approach for addressing the inaccessible design of courses offerings is deeply rooted in the culture of most educational institutions. With this approach, an accommodation is provided to a student when an adjustment is required in order for a student with a disability to effectively engage in a course. To secure an accommodation, typically the student must provide documentation of a disability to a specified office. The institutional representative reviews the documentation and approves accommodations considered “reasonable” and, with the permission of the student, shares this information with instructors who implement the accommodations. Examples of accommodations include converting inaccessible materials to accessible formats, providing extra time on assignments and exams, captioning videos, and providing sign language interpreters. This process for securing accommodations marginalizes students with disabilities by requiring a segregated process for gaining access and does not always result in content and experiences equivalent to those of other students. And, unfortunately, the value associated with accommodations does not extend to students with disabilities who choose not to self-disclose and to other students in a class who might benefit from them.

The COVID-19 pandemic led to a dramatic increase in the number of formal and informal learning courses offered online. To ensure equity, it is important that these offerings are accessible to and inclusive of all students and instructors eligible to engage. An exploratory study focused on the accessibility of digital learning was recently conducted by the DO-IT (Disabilities, Opportunities, Internetworking, and Technology) Center [1] at the University of Washington (UW). DO-IT staff, along with collaborators with a wide range of relevant expertise, conducted a review of literature, participated in an on-site institute, and engaged in an online community of practice. After exploring online learning access barriers and solutions, they wrote a white paper to recommend ways to encourage instructors to teach accessible and inclusive digital learning opportunities and researchers to design accessible learning technologies and pedagogy [7].



Figure 2 A student uses assistive technologies that emulate the keyboard but not a mouse. Source: DO-IT, uw.edu/doit/line-drawings-and-images

Research collaborators found that many courses are not fully accessible to people with some types of disabilities, few instructors routinely use accessible and inclusive online curriculum and practices in their courses, and few digital learning researchers address accessibility issues in their studies. They found that many instructors who wish to address equity issues in their course design lack the skills required to design an accessible and inclusive course. Instructors also report little understanding of their obligations under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 and its 2008

Amendments when it comes to making their online learning offerings accessible to students with disabilities.

The collaborators also identified three sets of principles inspired by the practice of universal design (UD) that have well established guidelines and evidence-based practices that, when applied proactively, lead to a course that is accessible to, usable by, and inclusive of students with a wide variety of characteristics that include disabilities. The combination of these principles is particularly suitable for addressing all aspects of education, including technology, learning spaces, curriculum, and teaching practices. Together they ensure that students are offered multiple, accessible ways to gain knowledge, demonstrate understanding, and interact that minimize the need for additional disability-related accommodations for specific students.

## UNIVERSAL DESIGN IN EDUCATION

UD is defined by the Center for Universal Design [2] as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.” Principles for the UD of a product or environment include those that follow.

1. Equitable use: The design is useful and marketable to people with diverse abilities.
2. Flexibility in use: The design accommodates a wide range of individual preferences and abilities.
3. Simple and intuitive use: Use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level.
4. Perceptible information: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities.
5. Tolerance for error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.
6. Low physical effort: The design can be used efficiently, comfortably, and with a minimum of fatigue.
7. Size and space for approach and use: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user’s body size, posture, or mobility. [3]

Originally applied to the design of architecture and commercial products, these seven basic principles, have also been used to design hardware and software, instruction, student services, and other applications to ensure that they are accessible to and inclusive of everyone, including individuals with disabilities [4].

Several UD-inspired frameworks have emerged to specifically address instructional applications. Each is consistent with a common finding in research on formal and informal education at all levels: that learners are highly variable with respect to their abilities and responses to specific instructional practices. Universal Design for Learning (UDL), developed by the Center for Applied Special Technology, is the most common framework applied to curriculum and instructional practices. UDL-designed activities offer students multiple means of engagement, representation, and action and expression, described as follows.

1. Engagement: For purposeful, motivated learners, stimulate interest and motivation for learning.
2. Representation: For resourceful, knowledgeable learners, present information and content in different ways.
3. Action and expression: For strategic, goal-directed learners, differentiate the ways that students can express what they know [5].

There are also UD-inspired principles, guidelines, and practices to guide the design of accessible IT, including that used to deliver formal and informal learning activities. The internationally accepted Web Content Accessibility Guidelines (WCAG), published by the World Wide Web Consortium, require that accessibly designed IT apply four principles.

1. Perceivable: Users must be able to perceive the content, regardless of the device or configuration they're using.
2. Operable: Users must be able to operate the controls, buttons, sliders, menus, etc., regardless of the device they're using.
3. Understandable: Users must be able to understand the content and interface; and
4. Robust: Content must be coded in compliance with relevant coding standards in order to ensure its accurately and meaningfully interpreted by devices, browsers, and assistive technologies [6].



Figure 3 A young learner with a disability uses a mouth “wand” to access the keyboard. Source: DO-IT, uw.edu/doit/line-drawings-and-images

The combination of UD, UDL, and WCAG principles, which underpin UDE can be used to address all aspects of formal and informal learning, including technology, curriculum, pedagogy, and physical spaces [7]. Although the need for accommodations for individuals with disabilities is minimized with the UDE approach, reasonable accommodations are sometimes necessary when a course design does not fully meet the needs of a student with a disability. For example, a student with a learning disability engaging in a universally designed course may require extra time on an examination as a reasonable accommodation.

Examples of the design of formal and informal, fully online and hybrid learning practices supported by UDE principles are described in Table1.

Table 1. An example of a UDE practice supported by each UDE principle.

UDE Principle	Example of UDE Practice
UD 1. Equitable use	Curriculum materials are in formats accessible to people with a variety of abilities, ages, cultural backgrounds, and technologies.
UD 2. Flexibility in use	A student can choose to read or watch a video to learn content.
UD 3. Simple and intuitive	Testing is conducted in a predictable, straightforward manner.
UD 4. Perceptible information	An emergency alarm system in a science lab has visual, aural, and kinesthetic characteristics.
UD 5. Tolerance for error	A software application provides guidance when a student makes an inappropriate selection.
UD 6. Low physical effort	Software includes on-screen control buttons that are large enough for students with limited fine motor skills to select.
UD 7. Size and space for approach and use	A flexible work area in a computer lab is usable by students who are right- or left-handed and have a wide range of physical characteristics.
UDL 1. Multiple means of engagement	Multiple examples ensure relevance to a diverse student group.
UDL 2. Multiple means of representation	Multiple forms of accessibly designed media are used to present content.
UDL3. Multiple means of action and expression	An assigned course project optimizes individual choice and autonomy.
WCAG 1. Perceivable	A person who is blind and using a screen reader can access the content in images because text descriptions are provided.
WCAG 2. Operable	A person who cannot operate a mouse can navigate all content and operate all functions within a learning management system (LMS) by using a keyboard alone.
WCAG 3. Understandable	Definitions are provided for unusual words, phrases, idioms, and abbreviations.
WCAG 4. Robust	Electronic forms can be completed using a wide range of assistive technologies.

## TIPS FOR ONLINE INSTRUCTORS

Experiences teaching online and hybrid courses over many years, engagement with other online instructors and researchers, a review of the literature [7], and reports from students with a wide variety of disabilities in DO-IT projects hosted at the University of Washington [1], along with the requests from instructors for recommendations for getting started in designing accessible courses, motivated me to create in 2015 a short document, which has been periodically updated, *20 Tips for Teaching an Accessible Online Course*. The remaining content of this section is a

quotation from the 2022 version of the document; the most current version can be found in DO-IT's Center for Universal Design in Education [8].

Nine tips for course materials follow. Consult Accessible Technology at [uw.edu/accessibility](http://uw.edu/accessibility) for details on the design, selection, and use of accessible IT as well as accessibility checkers that help you identify accessibility problems in materials you use or create:

1. Use clear, consistent layouts, navigation, and organization schemes to present content. Keep paragraphs short and avoid flashing content
2. Use descriptive wording for hyperlink text (e.g., "DO-IT website" rather than "click here").
3. Use a text-based format and structure headings, lists, and tables using style and formatting features within your Learning Management System (LMS) and content creation software, such as Microsoft Word, and PowerPoint and Adobe InDesign and Acrobat; use built-in page layouts where applicable.
4. Avoid creating PDF documents. Post most instructor-created content within LMS content pages (i.e., in HTML) and, if a PDF is desired, link to it only as a secondary source of the information.
5. Provide concise text descriptions of content presented within images ([uw.edu/accessibility/documents](http://uw.edu/accessibility/documents))
6. Use large, bold, sans serif fonts on uncluttered pages with plain backgrounds.
7. Use color combinations that are high contrast and can be distinguished by those who are colorblind. Do not use color alone to convey meaning.
8. Caption videos and transcribe audio content.
9. Don't overburden students with learning to operate a large number of technology products unless they are related to the topic of the course; use asynchronous tools; make sure IT used requires the use of the keyboard alone and otherwise employs accessible design practices.

Eleven tips for inclusive pedagogy follow; many are particularly beneficial for students who are neurodiverse (e.g., those on the autism spectrum or who have learning disabilities). Consult Equal Access: Universal Design of Instruction for more guidance. Consult *Equal Access: Universal Design of Instruction* ([uw.edu/doit/equal-access-universal-design-instruction](http://uw.edu/doit/equal-access-universal-design-instruction)) for more guidance.

10. Recommend videos and written materials to students where they can gain technical skills needed for course participation.
11. Provide multiple ways for students to learn (e.g., use a combination of text, video, audio, and/or image; speak aloud all content presented on slides in synchronous presentations and then record them for later viewing).
13. Provide multiple ways for students to demonstrate what they have learned (e.g., different types of test

items, portfolios, presentations, single-topic discussions).

14. Address a wide range of language skills as you write content (e.g., use plain English, spell out acronyms, define terms, avoid or define jargon).
15. Make instructions and expectations clear for activities, projects, discussions, and readings.
16. Make examples and assignments relevant to learners with a wide variety of interests and backgrounds.
17. Offer outlines and other scaffolding tools and share tips that might help students learn.
18. Provide adequate opportunities to practice.
19. Allow adequate time for activities, projects, and tests (e.g., give details of all project assignments at the beginning of the course).
20. Provide feedback on project parts and offer corrective opportunities.

These tips apply to both synchronous and asynchronous teaching. Additional tips for synchronous presentations (e.g., speak all content presented visually, turn on the caption feature of your conferencing software, do not require students to have their cameras on) can be found in [the Center for Universal Design in Education].

## CONCLUSION

Proactively applying UDE instead of using an accommodations-only approach can make online learning more accessible and inclusive for both students who disclose and those who do not disclose their disabilities, and for many others as well, including those with a variety of learning preferences and levels of technological expertise, those for whom English is not their first language, and those with various cultural backgrounds. Taking steps toward more inclusive practices is particularly relevant because of legal mandates for making courses accessible to students with disabilities; a heightened interest of many educational entities in addressing diversity, equity, and inclusion issues; and continued interest in offering online and hybrid courses in a post-pandemic world.

## ACKNOWLEDGMENTS

The development of this paper was partially funded by the National Science Foundation (NSF #DRL-182540 and #DRL-1906147). Any opinions, findings, and recommendations expressed in this material are those of the author and do not necessarily reflect the views of the NSF.

## REFERENCES

- [1] DO-IT Center. **DO-IT**. Seattle: University of Washington. <https://www.washington.edu/doit/> (accessed February 1, 2022).
- [2] Center for Universal Design. **History of Universal Design**. Center for Universal Design. [https://projects.ncsu.edu/design/cud/about\\_ud/udprinciples.htm](https://projects.ncsu.edu/design/cud/about_ud/udprinciples.htm) (accessed February 1, 2022).
- [3] M. F. Story, J. L. Mueller, and R. L. Mace, Editors. **The Universal Design File: Designing for People of All Ages and Abilities**, Raleigh, NC, USA: Center for Universal Design, 1998, pp. 32–36.
- [4] S. Burgstahler. **Creating Inclusive Learning Opportunities in Higher Education: A Universal Design Toolkit**, Cambridge: Harvard Education Press, 2020.
- [5] Center for Applied Special Technology (CAST). **The UDL Guidelines**. [https://udlguidelines.cast.org/?utm\\_source=castsite&lutm\\_medium=web&utm\\_campaign=none&utm\\_content=aboutudl](https://udlguidelines.cast.org/?utm_source=castsite&lutm_medium=web&utm_campaign=none&utm_content=aboutudl) (accessed February 1, 2022).
- [6] World Wide Web Consortium. **Web Content Accessibility Guidelines (WCAG) 2.1**. World Wide Web Consortium. <https://www.w3.org/TR/WCAG21> (accessed February 1, 2022).
- [7] S. Burgstahler and T. Thompson, Editors. **Accessible Cyberlearning: A Community Report of the Current State and Recommendations for the Future**, University of Washington, Seattle, 2019: UW. Accessed: accessed February 1, 2022. [Online]. Available: <https://www.washington.edu/doit/accessible-cyberlearning-community-report>
- [8] Center for Universal Design in Education. **Universal Design of Instruction**. Center for Universal Design in Education. <https://www.washington.edu/doit/programs/center-universal-design-education/postsecondary/universal-design-instruction> (accessed February 1, 2022)