

ESSA and Digital Learning

Closing the Digital Accessibility Gap

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About The 10 | The 10 occasional series by AIR offers policymakers, educators, and the general public accessible research-based information on pressing education issues.



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Introduction

The Every Student Succeeds Act (ESSA) renews the federal government’s commitment to equal opportunity for all students while shifting more authority to states and districts to elevate the role of technology in planning and implementing innovative programs. Educators can take advantage of the flexibility ESSA provides to expand the focus of their technology initiatives to include the intersection of accessibility, educational technology, and assistive technology. This expansion will enable educators to address gaps in student achievement and improve digital literacy through blended and personalized learning.

Technology tools are deeply entwined in the ways that we learn, work, communicate, and play. New technologies have changed the way teachers, administrators, families, and students interact, teach, and learn (Fishman & Dede, 2016; Gouseti, 2014; U.S. Department of Education, Office of Educational Technology, 2017). For instance, schools and districts enrich student learning with online courses, videos, and other interactive materials — and they engage parents and families through online portals, social media, and learning platforms.

At the same time, ESSA prioritizes educational technology’s role in supporting improved outcomes for all students. ESSA focuses on and codifies definitions of universal design for learning (UDL), digital learning, and personalized and blended instruction (CAST, 2016; Center for Digital Education, 2017). To put it simply, the law is symbolic of a shift in thinking about how we use technology tools to address learner variability.



Within this landscape of technology innovation and new federal policy, state and local educators have an unprecedented opportunity to invest in technologies and professional development to transform teaching and learning.

It is critical for state and district education leaders to work strategically to maximize educational and assistive technologies, bolstered by UDL principles, to ensure that digital learning is accessible to *all* learners — including those with disabilities or those who have limited English proficiency.

So, what does “transformative technology” use look like for students with disabilities? How can states and districts ensure that digital accessibility is at the forefront of their ESSA technology planning? How can accessible technology support personalized learning? What do educators need to consider as

they implement innovative digital learning plans? With the growth of open educational resources (OERs) — free content available for teachers to use, modify, and share without paying any licensing fees or requesting permission — the issue of accessibility must be kept on the front burner to ensure equal access to educational materials.

Based on our extensive, on-the-ground experience with the convergence of digital and personalized learning, assistive technology, accessibility features, and UDL, we have created this publication to address the 10 most frequently asked questions from key stakeholders, including state and district leaders, educators, and families.

“... institutions should develop and implement learning resources that embody the flexibility and power of technology to create equitable and accessible learning ecosystems that make learning possible everywhere and all the time for all students ... [I]nstitutions should insist on the use of resources and the design of learning experiences that use UD practices to ensure accessibility and increased equity of learning opportunities” (U.S. Department of Education, Office of Educational Technology, 2017)

QUESTION 1

How Is Technology Transforming Education ?

Assistive and educational technologies have changed dramatically and have made possible what previously was impossible, particularly in the education environment (Crossland et al., 2016; Gray & Silver-Pacuilla, 2011). Take, for instance, the fact that students now can conduct virtual chemistry experiments to bring the elements to life, use augmentative reality to create 3D geometric models, or make a video to demonstrate their understanding of the impact of environmental erosion on the waterfront (U.S. Department of Education, Office of Educational Technology, 2017).

Game Changers in Education Technology

- **Smaller and less expensive hardware (e.g., compact devices and wearable electronics).**
- **Reduced needs for power and availability of cheaper, smaller power sources.**
- **Improvements in internet networks and broadband capabilities.**
- **New developments in user interfaces and input options (e.g., touch screens, gesture recognition, brain interfaces, and haptic feedback).**
- **Open-source and community development (e.g., [Arduino](#), and [DIY and Makerspaces](#)).**
- **Access to tools of creation (e.g., 3D printers, Raspberry Pi, and app development tools).**
- **OERs to supplement individual lesson plans, stand-alone videos, and simulations, as well as the replacement of entire curricula (e.g., Engage NY ELA or Eureka Math).**

“Supports to make learning accessible should be built into learning software and hardware by default ... Modern public buildings include features such as ramps, automatic doors, or Braille on signs to make them accessible to everyone. In the same way, features such as text-to-speech, speech-to-text, enlarged font sizes, color contrast, dictionaries, and glossaries should be built into educational hardware and software to make learning accessible to everyone” (U.S. Department of Education, Office of Educational Technology, 2017)

At the same time, many schools and districts find themselves behind the curve as a result of limited budgets, lack of teacher preparation, and initiative fatigue. However, with ESSA’s focus on learning through technology giving states and districts added flexibility to innovate, education leaders are uniquely positioned to help set an agenda and vision for learning that is technology-enriched, personalized, and accessible. In this environment, educators are charged with rethinking, redesigning, and reshaping both general and special education to align with federal law (Gordillo, 2015) while also addressing the changing technology landscape to ensure that students with disabilities have fair and equitable access to transformative technology-based learning experiences.

QUESTION 2

What Does the Law Say About Digital Accessibility?

Digital accessibility is enshrined in existing disability legislation (Wentz, Jaeger, & Lazar, 2011). Educators at all levels should be familiar with and understand federal- and state-level accessibility laws, including Sections 504 and 508 of the Rehabilitation Act of 1973, the Americans With Disabilities Act (ADA) of 1990 and its 2008 amendments, and the Individuals with Disabilities Education Improvement Act (IDEA) of 2004.

Universal (accessible) design is a legal obligation, but it is also vital to design digital content that all stakeholders can access. If any users are excluded from accessing content, then you are not meeting your duty to communicate with the public.

Although these laws do not explicitly address digital accessibility, case law and guidance from the U.S. Department of Justice (DOJ) and the U.S. Department of Education (ED) indicate that digital technologies fall under their umbrella. This interpretation was made explicit in two Statements of Interest filed by the DOJ in cases brought by the National Association for the Deaf against [Harvard](#) and [MIT](#). These statements underscore that the ADA was written explicitly to keep pace with developing technology and that website accessibility is mandatory (3Play Media, 2016).

Further, a joint DOJ and ED “Dear Colleague” letter on e-book readers similarly underscores the importance of ensuring that technology complies with disability laws, stating, “It is unacceptable for universities to use emerging technology without insisting that this technology be accessible to all students” (U.S. Department of Justice, U.S. Department of Education, 2010, 2011).

A more recent development occurred in January 2017. The United States Access Board released updated requirements for information and communication technologies covered by Section 508 of the Rehabilitation Act (United States Access Board, 2017; U.S. General Services Administration, 2018). These new requirements align U.S. standards with international standards for accessibility (World Wide Web Consortium, 2017) and address new and developing technologies to provide greater clarity when addressing digital accessibility.

Andrew F. v. Douglas County School District

- A child’s “educational program must be appropriately ambitious in light of his circumstances” and “every child should have the chance to meet challenging objectives.”
- “When all is said and done, a student offered an educational program providing ‘merely more than de minimis progress from year to year can hardly be said to have been offered an education at all.’ – Chief Justice John G. Roberts Jr. (2017)

What Are the Web Content Accessibility Guidelines (WCAG) 2.0?

- Defined by the [World Wide Web Consortium](#), the WCAG 2.0 (Henry, S. L., & Arch, A., eds. (2009):
 - Apply to a wide variety of web technologies, including electronic documents and software, and are designed to apply to advances in technology.
 - Provide clearer requirements to make testing (both automated and by people) and compliance more straightforward.
 - Create a single international standard for web content accessibility.
 - Are “organized around four design principles of web accessibility – perceivable, operable, understandable, and robust.”

Understanding the WCAG’s Four Principles of Accessibility (World Wide Web Consortium, 2017)

- Perceivable:
 - Provide text alternatives for non-text content.
 - Provide alternatives for time-based media.
 - Create content that can be presented in different ways, including by assistive technologies, without losing meaning.
 - Make it easier for users to see and hear content.
- Operable:
 - Make all functionality available from a keyboard.
 - Give users enough time to read and use content.
 - Do not design content that causes seizures.
 - Help users navigate and find content.
- Understandable:
 - Make text readable and understandable.
 - Make content appear and operate in predictable ways.
 - Help users avoid and correct mistakes.
- Robust:
 - Maximize compatibility with current and future user tools.

QUESTION 3

How Should Accessibility Fit into My ESSA Plan?

Technology, and how it specifically relates to accessibility, is an overarching theme throughout ESSA. Although the word “accessibility” does not appear in the law, it is an integral element in meeting the charge to

“... increase access to personalized, rigorous learning experiences supported by technology by providing technical assistance to local educational agencies to improve the ability of local educational agencies to use technology, consistent with the principles of universal design for learning, to support the learning needs of all students, including children with disabilities and English learners” (Every Student Succeeds Act of 2015, 2015).

With the increased focus on accessibility driven by ESSA and updates to Section 508, many states have included references to UDL, assistive technology, and/or accessible educational materials in their ESSA plans. Additionally, according to a review by the State Educational Technology Directors Association (SETDA), “23 states have a definition for accessible technologies, up from 18 states last year ... (and) 28 states also provide guidance to districts on the use of accessible technologies to improve outcomes” (Jones & Fox, 2018).

Technology plays an essential role in all students’ access to the curriculum and ensures equal educational opportunities that may foster improved outcomes. Educational leaders must prioritize accessibility when making technology-related decisions.

QUESTION 4

How Can Universal Design Principles Help Me Plan?

At its most basic, universal design (UD) is the principle that all products and the “built environment” are designed to be usable by everyone, regardless of age, ability, or status.

The built environment includes all the human-made physical spaces where we live, recreate, and work. These include buildings, furnishings, open and public spaces, roads, utilities, and other infrastructure. These structures and spaces affect our health by ... allowing or restricting access to physical activity, transportation, and social interactions (Collaborative on Health and the Environment, 2016).

Accessible and inclusive design benefits everyone, not just users with disabilities (Lazar, Goldstein, & Taylor, 2015). For example, many accessibility features — such as closed captioning, touch screens, or the ability to change text appearance — are used and appreciated daily by a wide variety of technology users of all ages and abilities.

A key concept related to UD is that content “born digital” should also be “born accessible.” This means that materials created specifically for a digital platform (e.g., websites, webinars, digital documents and spreadsheets, applications, and online forums) should be accessible from the beginning.



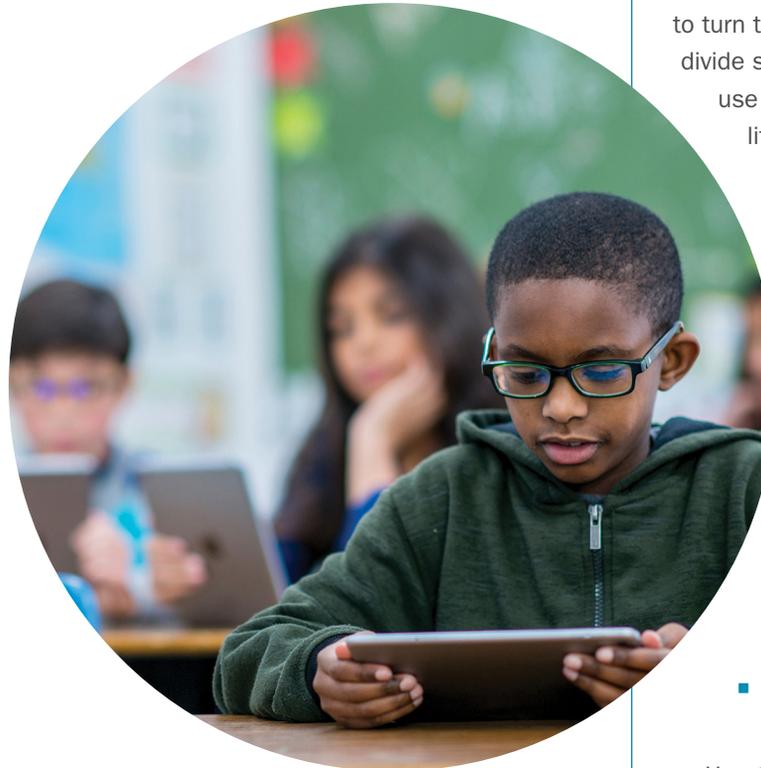
In an era of ever-shrinking educational budgets, designing for accessibility first, rather than waiting to accommodate or retrofit later, saves time and money (Wentz et al., 2011). Taking a UD and UDL perspective from the start means that school and district staff can think about how to present information in multiple ways that is accessible to a wide variety of users (CAST, 2018a). More importantly, they can think about accessibility first when purchasing technology and developing content.

UD + Learning = UDL

- **Universal Design for Learning principles promote the creation of materials that work for all learners. This is not a single, one-size-fits-all solution but rather flexible approaches that can be customized and adjusted for individual needs (CAST, 2018).**
- **Put UDL principles into practice to meet the diverse learning needs of students, including those with disabilities (PowerUp What Works, 2018):**
 - ***Principle I: Provide multiple means of representation*** – Learners differ in the ways that they perceive and comprehend information that is presented to them.
 - ***Principle II: Provide multiple means of action and expression*** – Learners differ in the ways that they navigate a learning environment and express their understanding.
 - ***Principle III: Provide multiple means of engagement*** – Learners differ in the ways in which they can be engaged or motivated to learn.

What Is Accessible Content?

- **All users can navigate, perceive, understand, and interact with the content.**
- **The content considers the needs of individuals with physical, visual, speech, auditory, neurological, and cognitive disabilities.**



QUESTION 5

How Do Accessibility, Technology, and Personalized Learning Intersect?

The availability of computers, interactive whiteboards, multimedia, high-speed internet, and OERs in K-12 classrooms has improved access to technology tools and resources that move us closer to closing the so-called “digital divide.” ESSA calls on educators to turn their attention to addressing the digital “use” divide so all students can engage with technology; use it to create, design, and build; and become lifelong, active learners.

ESSA also represents the first federal definitions of “personalized learning” and “blended learning.” As teachers tackle the issue of personalized learning, they will need guidance on:

- How to use technology to support formative assessment.
- How to use technology to support the diverse needs of all students in an inclusive classroom.
- How to use student data to personalize instruction.
- How to better integrate technology into instruction.
- How to use OERs to enhance teaching and learning.

Teachers can more effectively personalize instruction to serve the needs of all students, particularly those with disabilities, by taking advantage of technologies that feature:

- Embedded supports (e.g., visual supports for auditory information, text-to-speech, word prediction, closed captioning, and voice recognition).
- UDL principles incorporated into the design of learning activities.
- Fully accessible content.
- Built-in opportunities for formative assessment.

Benefits and Challenges of OERs

- OERs offer the opportunity for teachers to enhance and personalize their teaching and learning. Open licenses have been created by organizations such as Creative Commons for learning resources. For software, open license types are available (e.g., GNU General Public License). This is significant given that the United States spends approximately \$8 billion each year purchasing commercial learning resources (Association of American Publishers, 2015). Nineteen states now provide a statewide repository to help teachers access, curate, refine, and share openly licensed learning resources (U.S. Department of Education, 2017).
- Unfortunately, many OERs and the platforms where they reside do not consider the learning needs of students with disabilities. For example, OERs are available only in inflexible formats like PDFs with minimal access through assistive technologies. Often, these web-based OERs do not adhere to best practices for digital accessibility. A review of these materials indicates that they offer limited ability to customize them to meet the individual needs of students (Treviranus, 2014).

QUESTION 6

What Are the Benefits of Accessibility?

Products and tools designed to support individuals with disabilities often have unexpected benefits for people without disabilities. For example, common embedded supports, such as voice recognition and word prediction, not only are essential access points for users with disabilities, but they also have become indispensable features for all technology users.

There are universal benefits to ensuring that all images feature alternative text, all forms and websites are navigable by keyboard, all audio content is captioned, and all content is clearly organized, including:

- Reduced barriers to use.
- Acknowledgment of equity issues in technology access.
- Improved access for older people, who may have challenges viewing content, navigating with a mouse, and/or hearing audio content.
- Better usability and readability.
- Enhanced search engine optimization (Asakawa, 2005; Fichten et al., 2009; Henry & Arch, 2012; McCarthy & Swierenga, 2010).



The Benefits of Captions

- Communicate content in settings where sound is unavailable.
- Increase engagement with content.
- Support understanding if the speaker or audio is difficult to understand.
- Improve reading ability, word recognition, vocabulary, and comprehension.
- Support language learning.

(Bowe & Kaufman, 2001; Evmenova, 2008; Linebarger, 2001; Rickelman, Henk, & Layton, 1991)

QUESTION 7

How Can I Get Started?

For every school and district, addressing inaccessible technology begins with planting the accessibility seed. In other words, you need to ensure that all staff understand the critical importance of accessible technology and content. As technology continues to change, we will face new challenges to ensuring that all learners have access to high-quality and engaging learning experiences. Review the current technologies used in your school or district and ask:

- How are students with disabilities currently using technology tools for learning? What barriers do they encounter? What assistive technologies do they use?
- Are all of our staff aware of the need for accessibility? Do they know how to make content accessible for students?
- Is accessibility a part of our decision-making process for purchasing technology?

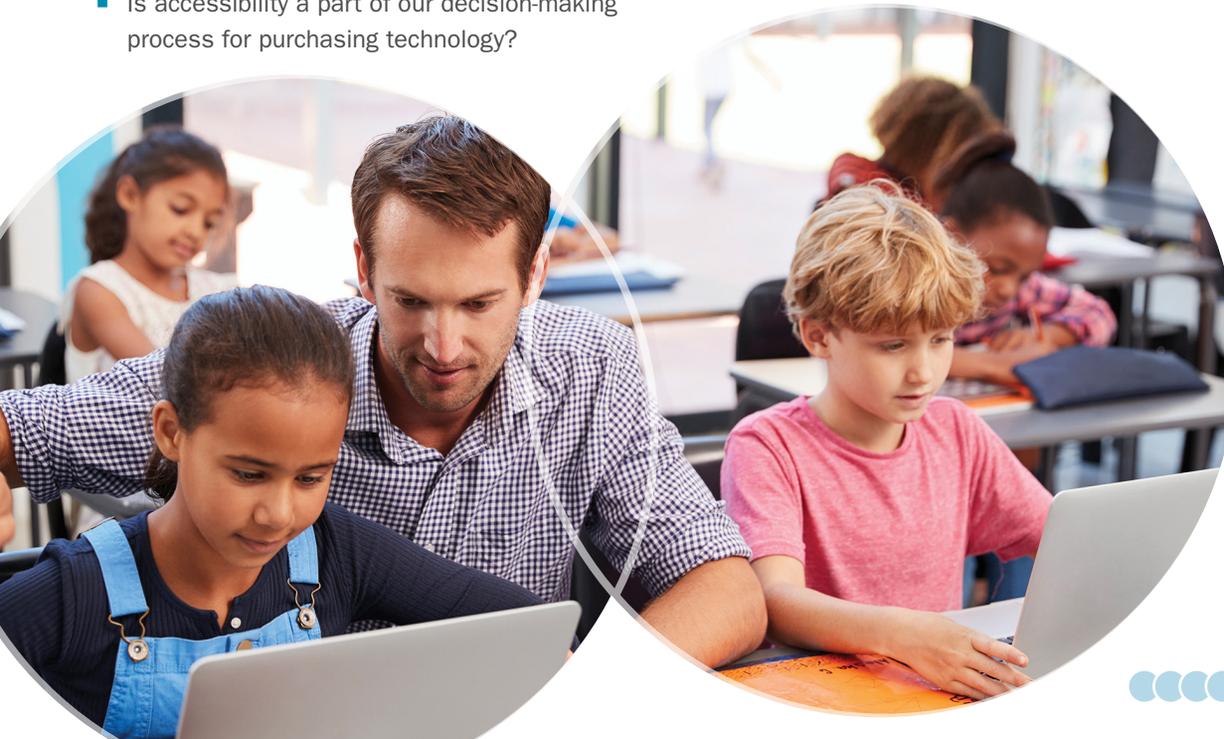
Here are five accessibility action steps to consider as you get started:

- Ensure that your teams understand accessibility legislation at the federal and state level.
- Develop and communicate an institutionwide vision of accessible technology for all and a commitment to UDL.
- Set goals and benchmarks with clear timelines for success.
- Incorporate UDL principles into lesson planning, curriculum choices, and technology purchasing decisions.
- Support classroom teachers in learning about educational and assistive technology basics, providing supports for students with disabilities, and incorporating accessible educational materials (AEM) and creating their own accessible materials (Crossland et al., 2017; Ruedel, Crossland, Gray, & Wellington, 2017).

10 Tips for Creating More Accessible Content

- Give your document a clear and meaningful title.
- Use true headings and ordered lists to organize.
- Write in plain English and avoid large paragraphs.
- Provide text alternatives for audio and video content.
- Use descriptive links and avoid “click here.”
- Add alt-text to images; use null (“”) for images that are purely decorative.
- Ensure tables have headings and labels.
- Check color contrast.
- Avoid using images of text.
- Label forms and make sure they can be filled out using only a keyboard.

(Crossland, 2018)



QUESTION 8

What Is Important to Consider During the Technology Procurement Process?

State and local education leaders must move toward being proactive about accessibility, as opposed to being purely reactive only when problems arise. This shift begins by prioritizing procurement of accessible technology and resources.

Consider taking the following steps to be proactive about your procurement process (Crossland et al., 2017):

- Research accessibility legislation and ensure that all staff understand their legal responsibility to provide accessible learning materials and resources.
- Let developers and publishers know that you expect digital textbooks, resources, and learning materials to be built according to industry accessibility standards and ensure that this language is included in all vendor contracts.
- Make reviewing for accessibility an integral part of your purchasing and procurement of new technologies.
- Build staff capacity around accessibility features and considerations when selecting or developing content.
- Set an institutionwide expectation that accessibility is not only mandatory but also everyone's responsibility.

Technology decision-makers should look for (Crossland et al., 2017):

- Technology companies that clearly and explicitly address accessibility. You can request a Voluntary Product Accessibility Template (VPAT) in all technology contracts and purchases.
- Tools and content that feature prompts and embedded supports.
- Products that give students control and agency in accessing needed supports.
- Products that include fully captioned and accessible media and videos.



QUESTION 9

What Is the Relationship Between Accessibility and Usability?

Guidelines, checklists, and standards are useful tools to ensure that your content is accessible, but accessibility is more than just a checklist for compliance. Understanding students and how they use web and digital content can help schools and districts move beyond the technical components of accessibility to develop a usable *and* accessible learning experience (Crossland, 2017).

Too often, the focus on accessibility is driven primarily by compliance instead of the variable needs of individual learners (Asakawa, 2005). For instance, many buildings added ramps and wheelchair access long after their original design, and in some cases, that means the ramp was placed too far away from the main entrance. In contrast, modern, universally designed buildings find ways to incorporate accessibility features into core spaces, so that everyone, regardless of ability, can use and access the space in the same way, at the same time, and in the same place.

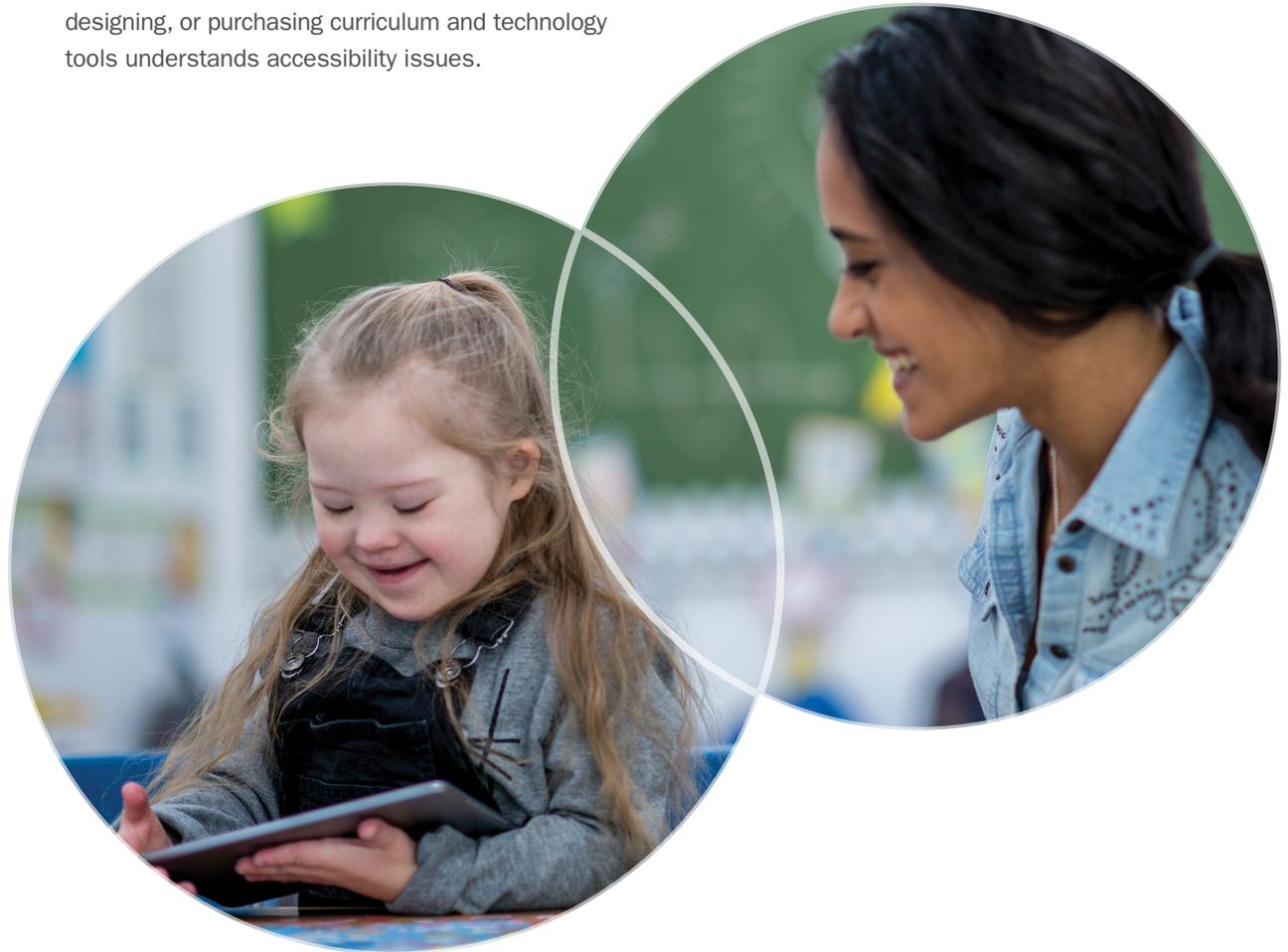
Here are some strategies that can help you go beyond merely complying with technology accessibility laws:

- Involve people with disabilities in designing curriculum and/or selecting learning technologies.
- Ask people with disabilities to review content, websites, and selected learning technologies.
- Solicit feedback from students and families on an ongoing basis and/or provide them with an easy way to report barriers and accessibility issues.
- Ensure that everyone involved in developing, designing, or purchasing curriculum and technology tools understands accessibility issues.

What Do These Two Examples of Physical Accessibility Features Have in Common?

- A ramp with a large flower pot placed in the middle.
- A Braille sign for the restroom is placed above the door, out of reach.

They both ensure compliance with the law (physical access, alternatives to text) but are in fact completely unusable by someone with a disability. It is critical to remember that accessibility is about people, not just compliance.



QUESTION 10

What Are Characteristics of Schools, Districts, and States that Have Successfully Addressed Technology and Accessibility?

States and districts that have successfully implemented accessible technology strategies have at least one thing in common: They recognize that it takes a team to ensure that digital accessibility is part of the culture. Everyone has a role to play, from administrators, teachers, IT coordinators, professional development providers, and community leaders. Commitment, vision, and leadership is critical at each level — the school, school committee or board, district, state, and agency — and digital accessibility must also be a priority at every level.

In our work with states and districts to address UDL and accessibility, we have identified the following common themes and strategies, which are critical to the process:

Increase knowledge:

- Build expertise and familiarity with digital accessibility.
- Share accessibility tips and training resources.
- Add accessibility language and guidelines to state documents (e.g., RFPs, purchase order agreements, district communication documents, etc.) so it becomes standard practice.
- Include accessibility tips in state, district, and school communications.
- Organize training and regular meet-ups for state, district, and school staff to develop internal accessibility specialists.

Collaborate:

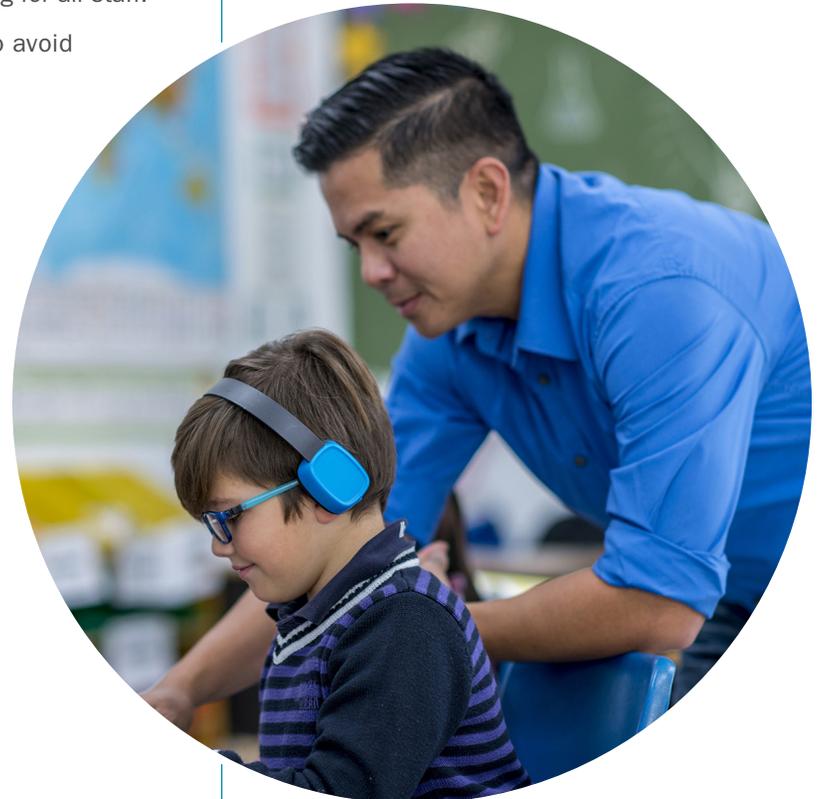
- Facilitate communities of practice to extend training workshops and give participants a chance to work together.
- Provide staff with one-on-one coaching and accessibility tips.
- Spread knowledge and leadership by building capacity through multiple departments within the state, district, or school.
- Communicate regularly across and between departments.

Improve training and support for staff:

- Offer one-time introductory training for all staff.
- Start with simple instructions to avoid overwhelming staff.
- Provide ongoing trainings and coaching.
- Designate a main contact person for questions.
- Create a public workspace to post resources, training videos, and information, and offer “anytime, anywhere access” (Ruedel et al., 2017).

Everyone is Responsible for Accessibility

As education leaders implement their ESSA plans, the time to address digital accessibility is now. Digital teaching and learning is woven throughout ESSA and provides a runway for educators to use technology in innovative ways to personalize instruction. To make this a reality, educators at all levels must ensure that digital learning is universally designed and accessible to meet the needs of all students. This is your call to action. Closing the digital accessibility gap is now within reach.



References

- 3Play Media. (2016 October 20). Application of the ADA to modern technology [Webinar]. Retrieved from <https://www.3playmedia.com/resources/recorded-webinars/an-architect-of-the-ada-on-its-application-to-modern-technology/>
- Asakawa, C. (2005). What's the web like if you can't see it? In *Proceedings of the 2005 International Cross-Disciplinary Workshop on Web Accessibility (W4A)* (pp. 1–8). New York, NY: ACM. DOI=<http://dx.doi.org/10.1145/1061811.1061813>
- Association of American Publishers. (2015). Instructional materials funding facts. Retrieved from <http://publishers.org/our-markets/prek-12-learning/instructional-materials-funding-facts>
- Bowe, F. G., & Kaufman, A. (2001). *Captioned media: Teacher perceptions of potential value for students with no hearing impairments: A national survey of special educators*. Spartanburg, SC: Described and Captioned Media Program.
- CAST. (2016). UDL in the ESSA. Wakefield, MA: Author. Retrieved from <http://www.cast.org/whats-new/news/2016/udl-in-the-essa.html#.W9uUvdVKipp>
- CAST. (2018a). About universal design for learning. Retrieved from <http://www.cast.org/our-work/about-udl.html#.W6ABauhKiUk>
- CAST. (2018b). Universal design for learning guidelines version 2.2. Retrieved from <http://udlguidelines.cast.org>
- Center for Digital Education. (2017). *ESSA, EdTech, and the future of education*. Folsom, CA: e.Republic, Center on Digital Education. Retrieved from <http://www.govtech.com/education/papers/ESSA-EdTech-and-the-Future-of-Education-76404.html>
- Collaborative on Health and the Environment. (2016). Built environment. Retrieved from <https://www.healthandenvironment.org/environmental-health/environmental-risks/built-environment>
- Crossland, A. (2017). *Accessibility is more than a checklist*. Washington, DC: American Institutes for Research, Center on Technology and Disability. Retrieved from <https://www.ctdoinstitute.org/library/2017-01-06/accessibility-more-checklist>
- Crossland, A. (2018, March 19). 10 Things You Can Do Today to Improve Accessibility [Blog post]. Retrieved from <https://powerupwhatworks.org/blog/10-things-you-can-do-today-improve-accessibility>
- Crossland A., Gray, T. Reynolds, J., Wellington, D. Zhou, A., & Justo-Zavaleta, M. (2017). *Digital accessibility toolkit: What education leaders need to know (Updated)*. Washington, DC: American Institutes for Research, Consortium on School Networking, Center on Technology and Disability. Retrieved from <https://www.ctdoinstitute.org/library/2016-10-11/digital-accessibility-toolkit-what-education-leaders-need-know>
- Crossland, A., Ruedel, K., Gray, T., Wellington, D., Reynolds, J., & Perrot, M. (2016). *Future ready assistive technology: Fostering state supports for students with disabilities*. Washington, DC: American Institutes for Research, Center on Technology and Disability. Retrieved from http://ctdoinstitute.org/sites/default/files/file_attachments/CTD-AIR-FutReadyAssistTech.pdf
- Every Student Succeeds Act of 2015, Pub. L. No. 114-95 § 114, Stat. 1177 (2015-2016).
- Evmenova, A. S. (2008). *Lights! Camera! Captions! The effects of picture and/or word captioning adaptations, alternative narration, and interactive features on video comprehension by students with intellectual disabilities* [Doctoral dissertation]. Fairfax, VA: George Mason University, College of Education and Human Development.
- Fichten, C. S., Ferraro, V., Asuncion, J. V., Chwojka, C., Barile, M., Nguyen, M. N., Klomp, R., & Wolforth, J. (2009). Disabilities and e-learning problems and solutions: An exploratory study. *Educational Technology & Society*, 12(4), 241–256.
- Fishman, B., & Dede, C. (2016). Teaching and technology: New tools for new times. In D. Gitomer & C. Bell (Eds.), *American Educational Research Association handbook of research on teaching* (5th ed.). New York, NY: Springer.
- Gordillo, W. J. (2015, January 6). Top 10 trends in special education [Blog post]. Retrieved from <http://www.scilearn.com/blog/2015-special-education-trends>
- Gouseti, A. (2014). Digital technologies in education: New tools for new times? In: *Digital technologies for school collaboration*. New York: Palgrave Macmillan.
- Gray, T., & Silver-Pacuilla, H. (2011). *Breakthrough teaching and learning*. New York, NY: Springer.
- Henry, S. L., & Arch, A., eds. (2009). How WCAG 2.0 differs from WCAG 1.0. Cambridge, MA: W3C. Retrieved from <https://www.w3.org/WAI/WCAG20/from10/diff.php>
- Henry, S. L., & Arch, A., eds. (2012). Developing a web accessibility business case for your organization. Cambridge, MA: W3C. Retrieved from <https://www.w3.org/WAI/bcase/Overview.html>
- Jones, R., & Fox, C. (2018). *Navigating the digital shift 2018: Broadening student learning opportunities*. Washington, DC: State Educational Technology Directors Association (SETDA). Retrieved from https://www.setda.org/master/wp-content/uploads/2018/05/Nav_ShiftIII_Accessible5.29.18-1.pdf
- Lazar, J., Goldstein, D. F., & Taylor, A. (2015). *Ensuring digital accessibility through process and policy*. Waltham, MA: Morgan Kaufmann.
- Linebarger, D. L. (2001). Learning to read from television: The effects of using captions and narration. *Journal of Educational Psychology*, 93, 288–298.
- McCarthy, J., & Swierenga, S. (2010). What we know about dyslexia and web accessibility: A research review. *Universal Access in the Information Society*, 9, 147–152.
- PowerUp What Works. (2018). *Incorporating universal design for learning: Three principles of universal design for learning (UDL)*. Washington, DC: Author. Retrieved from <https://powerupwhatworks.org/page-puww/incorporating-universal-design-learning>
- Rickelman, R. J., Henk, W. A., & Layton, K. (1991). Closed-captioned television: A viable technology for the reading teacher. *The Reading Teacher*, 44(8), 598–599.

- Ruedel, K., Crossland, A., Gray, T., Wellington, D. (2017). *State spotlight: Utah. State strategies to address digital accessibility*. Washington, DC: American Institutes for Research. Retrieved from https://www.ctdinstitute.org/sites/default/files/file_attachments/CTD-StateSpotlightUtah-508.pdf
- Treviranus, J. (2014). Leveraging the web as a platform for economic inclusion. *Behavioral Sciences & the Law*, 32(1), 94–103. doi:10.1002/bsl.2105
- U.S. Department of Education, Office of Educational Technology. (2017). *Reimagining the role of technology in education: 2017 National Education Technology Plan Update*. Washington, DC: U.S. Department of Education. Retrieved from <https://tech.ed.gov/netp/>
- U.S. Department of Justice, Civil Rights Division, & U.S. Department of Education, Office of Civil Rights. (2010). Joint “dear colleague” letter: Electronic book readers. Retrieved from <https://www2.ed.gov/about/offices/list/ocr/letters/colleague-20100629.html>
- U.S. Department of Justice, Civil Rights Division, & U.S. Department of Education, Office of Civil Rights. (2011). Frequently asked questions about the June 29, 2010, Dear Colleague letter. Retrieved from <https://www2.ed.gov/about/offices/list/ocr/docs/dcl-ebook-faq-201105.html>
- U.S. General Services Administration. (2018). IT accessibility laws and policies. Retrieved from <https://www.section508.gov/manage/laws-and-policies>
- United States Access Board. (2017). Information and Communication Technology (ICT) Final Standards and Guidelines. Retrieved from <https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/final-rule>
- Wentz, B., Jaeger, P.T., Lazar, J. (2011). Retrofitting accessibility: The legal inequality of after-the-fact online access for persons with disabilities in the United States. *First Monday*, 16(11). Retrieved from <http://www.firstmonday.org/ojs/index.php/fm/article/view/3666/3077>
- World Wide Web Consortium. (2017). How to meet WCAG 2.0 (quick reference). Cambridge, MA: W3C. Retrieved from <https://www.w3.org/WAI/WCAG20/quickref/#meaning>



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