




Designing an Inclusive Future

Including Diversity and Equity With Innovations in Special Education Technology

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Mission: The mission of the Innovations of Special Education Technology (ISET) division of Council for Exceptional Children (CEC) intersects many different aspects of technology use for learners with disabilities. Learners with disabilities live in a complex intersection of cultural and identity-related factors that must be valued. Careful consideration and implementation of assistive and instructional technologies can help support an inclusive education for diverse learners. The relationship between technology and diversity, equity, and inclusion (DEI) is complex, as technology can both add to and disrupt the unique educational experiences by diverse learners.

Social Justice Statement: The ISET division of CEC condemns discrimination in all of its forms (e.g., racism, ableism, linguisticism, sexism, classism, etc.). We support equity, diversity, and inclusion for all people. ISET recognizes that the relationship between technology and equity and diversity is complex and always evolving. When done well, technology implementation can bring new capabilities to support the full inclusion and abilities of people with disabilities. When implemented without intentionality and inclusion in forefront, technology can be used in ways that exclude and increase division. We believe that our members have a vital role to play in preventing this type of abuse. As an organization, we aim to build awareness of equity and justice issues and to include more voices to our division. We also recognize that we need to continue to reflect, learn, and act to break down barriers and prevent new ones from being created. Going forward together, ISET will intentionally weave in diversity, equity, and inclusion (DEI) initiatives into our identity, organizational structure, and all future projects.

Note: As part of our journey as a division, ISET has drafted this initial DEI statement. The most current ISET DEI statement will be published on our division’s website. This document is to be an evolving statement enhanced by feedback from our members and stakeholders.

This article describes the intersection of diversity and technology and Innovations in Special Education Technology (ISET) efforts, as a division and as professionals, to promote diversity, equity, and inclusion (DEI) through technology in education. ISET recognizes that a commitment to DEI is important because school demographic data indicate the current population of school-age children is increasingly diverse in race, ethnicity, language, and ability (National Center for Education Statistics, 2020). Educators must consider the barriers faced by our diverse student body and work to combat the many “-isms” that impact learners. These -isms contribute to issues of over- and underrepresentation of racially, ethnically, and linguistically diverse students in special education and cultural mismatch with the curriculum (Dever et al., 2016).

Technology is infused into our daily lives and is used by nearly everyone. For this reason, ISET focuses on technology integration with a wide range of purposes. Educational technology falls on a spectrum from universal instructional supports for all learners (e.g., digital graphic organizers, virtual manipulatives, speech-to-text voice recognition, text-to-speech) to highly specialized assistive technology (AT) to support individual needs impacted by a disability.

Examples of Universal Instructional Supports

The Assistive Technology Act (2004) describes an AT *device* as “any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities” (e.g., electronic mobility switches, screen-reading software, alternative keyboards).

While technology designers are responsible for ensuring the technical aspects of accessibility are possible, some of the functional aspects of accessibility are the responsibility of the content creator. General accessibility features (e.g., closed captioning) can be beneficial for people with disabilities (i.e., closed captioning for a person who is deaf) or others without disabilities (i.e., closed captioning while riding public transit). However, to be effective, universally designed technologies must be accessible by AT users. For example, a student who utilizes a screen reader to access a digital document may not be able to access that document if it is merely an image without recognizable text or structure (Rose et al., 2005).

While technology can be transformational—a means to provide access to instruction and to the world—technology is sometimes used in ways that create more barriers and perpetuate systemic inequities for those who

experience marginalization by society. Although Universal Design for Learning (UDL) and AT are well supported in policy and practice, more work is needed. In the newest iteration of the UDL framework, “UDL Rising to Equity” (CAST, 2021), leaders in the field of UDL “pushed beyond focus on learner variability as differences in abilities (i.e., intellectual, physical, sensory, etc.) to include diversity along many lines (i.e., socio-economic status, cultural background, world experiences, etc.)” (Hollingshead et al., 2020, p. 22). As Liasidou (2013) proposed, efforts around UDL must be strengthened by critical pedagogies like culturally responsive and sustaining practices to achieve the transformational educational aims of its promise.

Technology as a Barrier

The term “digital divide” has been around since the mid-1990s, with an emergent definition related to disparities in access to the Internet and computers based on factors such as race, gender, and socioeconomic status (Light, 2001). In addition to the physical access divide (e.g., rural vs. suburban and urban), Gorski (2009) emphasized the presence of sociocultural digital inequities. For example, despite access to computers and Internet, students of color in urban districts and students from indigenous communities may not have the

opportunity to engage in the same kinds of higher-order thinking instruction with those tools because they tend to have fewer resources and teachers with less pedagogical training. Gender socialization also plays into digital inequities. For these reasons, there is a disproportionate representation of affluent White men in technology-related fields (Gorski, 2009).

In addition to lack of access to certain technologies, educators are not always aware of accessibility limitations of some popular technologies and/or the role they play in making instructional content accessible. This is an example of technology contributing to ableism. The Web Accessibility Initiative (WAI) is an initiative created by the World Wide Web Consortium (W3C), an international community where staff, member organizations, and the public work together to develop web standards. Even the web accessibility standards themselves can perpetuate ableism because they address mostly sensory and physical disabilities while largely ignoring other disability types. In 2020, the WAI drafted recommendations for accessibility for cognitive and learning disabilities to address this gap in the current standards and improve accessibility on the web.

Technology can also be a barrier to equity and inclusion for individuals with disabilities who experience systemic oppression through microaggressions (i.e., indirect, subtle, or unintentional discrimination against marginalized social identities), discrimination (i.e., prejudicial treatment based on the grounds of social identity such as race or ethnicity), and cyberbullying on socially interactive technologies. Reports of cyberbullying are especially common for youth with disabilities and those from collectivist backgrounds, like some Latinx, Asian, and indigenous cultures (Espinoza & Wright, 2018). Technology-facilitated microaggressions can also occur without direct human interaction. Many educational apps include a “gamification” element where their avatar “character” is personalized (e.g., height, eye color, hair, skin tone). If the avatars are not reflective of the diversity of our learners (e.g., gender fluid, multirace, culturally relevant clothing options) or these “features” must be earned, students are excluded.

Considering learners with disabilities have complex, intersectional identities,

AT service, “any service that directly assists an individual with a disability in selection, acquisition or use of an assistive technology device,” becomes essential. Another technology-related barrier is the potential mismatch between available technologies and the learner’s cultural needs and values. AT needs to promote a positive self-identity and hold acceptable sociocultural meaning to avoid abandonment. AT implementation in the United States is based on Western ideologies promoting values of independence, control, and self-determination; however, not all cultures view these as desirable goals (Ripat & Woodgate, 2011). Kulkarni and Parmar (2017) described how the cultural beliefs about disability itself impact the use and perceptions of augmentative and alternative communication (AAC) devices as a form of AT. They noted how AT can be a cultural mismatch for many Asian Americans and Native Americans, who do not necessarily view disability as having medical or social causes, or for Mexican American families, who report linguistic barriers to accessing AAC training and support. AT access and usage barriers also are created by schools being underresourced and the underrepresentation of Black and other diverse voices in policymaking organizations (Ward-Sutton et al., 2020).

Moving Toward Inclusive Technology Integration

The examples presented here do not represent all intersectional aspects of identity and are only a snapshot of how technology can either promote or harm DEI efforts. The National Educational Technology Plan (U.S. Department of Education, 2017) promotes the use of equitable and accessible instructional technologies in the classroom. While this plan focuses on physical access and web content accessibility, it also encourages thinking about cultural and linguistic differences among learners. ISET supports an expanded definition of *equitable and accessible* to include explicit consideration of the learner’s intersectional identity.

Technology to Promote Equity and Accessibility

Because ability is only one aspect of a person’s identity, the UDL/AT spectrum

should be considered in conjunction with the entirety of a learner’s intersectional identity. UDL holds great promise as a framework for removing barriers for learning, but it cannot be implemented as an overlay on or addition to historically unjust systems. As part of a social justice movement, educators can embrace the commonalities of a culturally responsive and sustaining teaching mindset and the UDL framework because both focus on finding pathways to success for any student at risk of being marginalized or excluded by the curriculum (Fritzgerald, 2020). Combining the tenets of culturally responsive and sustaining teaching and UDL when selecting technology can help educators dismantle institutional barriers to learning by both acknowledging and elevating the unique cultural capital of each learner. Recommendations presented for selecting technology to support learning build on this existing work. Educators should embrace common themes from UDL, culturally responsive and sustaining teaching, and social justice.

Ms. Wilson, a sixth-grade general education social studies teacher, is preparing for a unit centered around a historical fiction novel that has multiple characters who speak Spanish within the text. Within her diverse classroom, she has students who receive Tier 2 reading interventions, students with varying learning and sensory disabilities, and English language learners, all of whom have additional racial, religious, ethnic, and cultural identities that make up their intersectional diversity. Ms. Wilson is concerned about how she will make the reading content accessible for all while also facilitating meaningful discussion about the text that will resonate with learners from so many different backgrounds. Fortunately, she has the support of a special education teacher, Mr. Patil, to help plan instruction and materials that meet everyone’s needs.

Recommendation 1: Create Accessible Materials From the Onset

Adhere to basic accessibility guidelines when developing documents, presentations, and videos (see **Table 1** and **Figure 1**). These guidelines are not meant to be interpreted as a comprehensive list but, rather, as an introductory list of considerations that could be executed by educators with minimal expertise on accessibility. Accessibility of technology

Table 1 Basic Accessibility Guidelines by Content Type With Hyperlinked Resources

<i>Content type</i>	<i>Guidelines</i>
Text	<ul style="list-style-type: none"> • Use <u>built-in heading levels</u> to provide semantic structure. • When using size/color/style of the font for emphasis, also use formatting labels.
Tables	<ul style="list-style-type: none"> • Designate header rows and columns. • Avoid any merged cells. <p>Use Alt Text to describe the table.</p>
Images and figures	<ul style="list-style-type: none"> • Use Alt Text to describe images and figures with a <u>meaningful description of the content</u> being conveyed. • If an image does not add new content from the text or narration, then use Alt Text to “mark as decorative.” • Consider the impact of <u>color on accessibility</u> or use noncolor indicators for differentiation.
Hyperlinks and hashtags	<ul style="list-style-type: none"> • <u>Avoid using URL addresses</u> to the maximum extent possible. • Link long hyperlinks to meaningful descriptive text like “course survey form” rather than vague phrases like “click here.” • Use <u>camel case</u> to create #ReadableHashtags.
PDFs	<ul style="list-style-type: none"> • Check that your document uses <u>selectable text</u> and is not actually an image in disguise. • Use <u>Optical Character Recognition (OCR)</u> software to scan the document and find the text.
Presentations	<ul style="list-style-type: none"> • Use existing templates as a starting point because slide titles and heading levels are often automatically included. • Check and <u>revise the reading order</u> for any added components (e.g., pictures, text) from the template. • Avoid overwhelming slides with too much text. • Visuals should complement the text to offer multiple means of representation (<u>add Alt Text</u>).
Videos	<ul style="list-style-type: none"> • Visuals should complement a clear and concise narration to reduce cognitive load and increase processing. • Add <u>quality closed captioning</u> that includes punctuation and visual cues for emphasis and pausing. • If the visuals are complex and necessary to understand the content, add audio descriptions of the visuals using technologies (e.g., <u>YouDescribe</u> or other description service). • When showing the speaker, use solid backgrounds (e.g., blue, green, gray) that contrast skin tone of the speaker for easiest viewing for sensory disabilities. • <u>Be aware of special effects</u> that may trigger seizures or interfere with processing (also relevant to presentations).

and instructional materials should consider differing abilities and unique cultural, linguistic, and socioeconomic differences (U.S. Department of Education, 2017). Accessible content and materials are a combined responsibility of both technology designers and the educators who create educational materials. Microsoft tools for example, have built-in capability to make accessible documents and presentations and even

have built-in accessibility checkers. However, if an educator does not design content using those features, the content may not be accessible to some learners. Often, it is more time-consuming to correct the inaccessibility of an existing document than it is to make an accessible document from the start.

As a first step, Ms. Wilson and Mr. Patil focus on accessibility of the reading material to

ensure all students have access to the text. They know they want to utilize a read-aloud format to support the comprehension of her students who are English language learners and/or who have learning disabilities by providing the opportunity to hear a fluent reader. The text they selected is also available digitally in an accessible format for those who may utilize additional features such as text-to-speech or dictionaries. Additionally, although they do not have any students who currently utilize a

Figure 1 QR codes to scan for digital version of Table 1



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screen reader to access print, having the digital text option will ensure they are prepared with accessible materials should they have a student with this need in the future.

Although the teachers are using the UDL principle of multiple means of representation to support their students, the instruction is still not accessible to every student in the classroom. One of the students in the class uses an American Sign Language (ASL) interpreter to access spoken language. Because this student is accessing fluent models of ASL, they cannot access the print and visual modes simultaneously. Another student uses Spanish at home and is hard of hearing. Ms. Wilson and Mr. Patil would like to integrate the value of the Spanish print and voice while also ensuring the text is accessible for all.

Recommendation 2: Factor Intersectional Diversity in AT Consideration

Explicitly consider intersectional diversity when determining AT for a student. Consider a whole child at the intersection of diversity categories: How does their complex identity impact technology access, choice, and preference? Be cognizant of your own intersectional identities and how your experiences can create biases in your decision-making—therefore include diverse voices on your team.

One commonly used framework for AT consideration is the SETT framework (Zabala, 2005). SETT stands for *student, environments, tasks, and tools* and helps guide the process of AT decision-making. While the prompts in the student part of SETT may imply recognition of elements of an individual's diversity and

intersectionality, it can be made more explicit. To help ensure the AT team considers the intersectional diversity of the learner through an asset-based lens, ISET suggests expanding the SETT framework to include explicit culturally reflective prompts to help guide decision-making. **Table 2** includes examples of culturally reflective prompts for each SETT component. These additional cultural and identity prompts are provided for not only the student section of SETT but also for environments, tasks, and tools.

In collaboration with the assistive technology specialist and the bilingual specialist, Ms. Wilson and Mr. Patil brainstorm potential solutions for this unit that would allow for the use of AT like text-to-speech, text highlighting, and an interpreter in a way that intentionally considers the impact of culture, language, modality, and teaching methods for individual students and the class. Ultimately, they decided to use a group read-aloud format. A digital version of the book was projected with the ASL interpreter stationed near the text so the Deaf student could also have the text presented in multiple modalities like their classmates. Ms. Wilson turned on the text-to-speech function with the volume turned down so the words would be highlighted as she played the audio narration of the book. Rather than reading the book aloud herself, she utilized a professional recording because she wanted to ensure the Spanish words were pronounced correctly in a fluent, human voice, which is important for the students with learning disabilities and for the Spanish-speaking student who is hard of hearing. Ms. Wilson periodically paused the narration to unpack events and Spanish vocabulary in the book. Mr. Patil controlled

the rate of the text-to-speech, highlighting from the computer to match the audio narration and to pause when they wanted to stop and discuss the text.

Recommendation 3: Select Technology That Is Reflective of the Users' Identity

Include families and students in the process of selecting technology options that are representative of their culture and identities. Critically review the technology for assumptions it might be making (e.g., having only two genders, only heterosexual couples). Use the self-reflective prompts presented in **Figure 3** to guide the selection of inclusive technologies that are representative of diverse learners. If representation is limited, explore additional tools on the market. If the technologies allow for customization, consider designing your own or collaborating with the art or theater department to create new visuals or recordings. If you have concerns with tools on the market, be an advocate and reach out to the tech developments with areas for improvement. Finally, to close the cycle, if a particular technology tool is not representative of the identity of the student but you do not have a better option, do not just ignore it. Talk to your students and their families about it.

Finding effective technology tools to support individuals with disabilities can be a challenge for educators. Some of the commonly recognized barriers include cost, maintenance, lack of educator knowledge, and assistive technology abandonment. It is also important to not add additional barriers by selecting tools that are not reflective of the learners' background. There may be both visual and auditory components of the technology that can create unforeseen barriers. For example, when examining an AAC technology, can the user customize the language or dialect of the voices? Can you customize people's gender, race, and clothing to reflect the user and avoid stereotypes? Are multicultural foods, activities, and actions available? For specific curricula like sex ed, are there image options that represent same-sex couples?

Ms. Wilson and Mr. Patil felt content about how they incorporated technology solutions

Table 2 Culturally reflective prompts for the SETT (student, environments, tasks, and tools) framework

SETT component	Additional reflective prompts to consider
Student	<ul style="list-style-type: none"> • What is the student’s native language(s) and preferred communication style(s)? • What cultural values does the student bring that may impact the way they interact with the world around them?
Environments	<ul style="list-style-type: none"> • To what extent do expectations and needs differ in the student’s home or community environments? • Are there any additional technical needs in the student’s home or community environments (e.g., availability of Wi-Fi or public access to Wi-Fi in rural vs. urban communities) that may need to be addressed differently?
Tasks	<ul style="list-style-type: none"> • What are some of the family’s culturally specific tasks that you should consider? • Does the family have the same goals for their child as the team?
Tools	<ul style="list-style-type: none"> • Is troubleshooting support available in the student and family’s native language(s)? • Is the tool being considered something that could easily be incorporated into the family’s home and community life?

Figure 2 QR codes to scan for digital version of *Table 2*



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into their social studies unit to meet diverse learning needs. They decide to spend some lunch hours inviting students in their class to have conversations about their learning to see if there are any other unique needs they had not considered for their future planning. They learned that many students enjoyed the exposure to the text in different ways. They also gave some suggestions for the future, like having students act out scenes from the text or finding/creating some illustrations to help them visualize some of the scenes they had trouble relating to. Through these conversations, the teachers learned about some additional strengths of their students that could be utilized in future units. One student showed the teachers some of her drawings she added to her reading journal that helped her think about the book. One

student, who is a native Spanish speaker, showed the teacher a great online picture dictionary that could be used to support Spanish vocabulary acquisition. Another student showed the teachers a video he found on TikTok of a person sharing their real-life experience related to the historical event from the story. Ms. Wilson and Mr. Patil had not before considered activities involving web searches to support student understanding of events and culture-specific scenarios that may be unfamiliar to them. Recognizing that providing accessible instruction that meets the needs of a diverse study body requires ongoing learning and reflection, they are now thinking about all the ways technology could provide even more academic, cultural, and linguistic access to the curriculum.

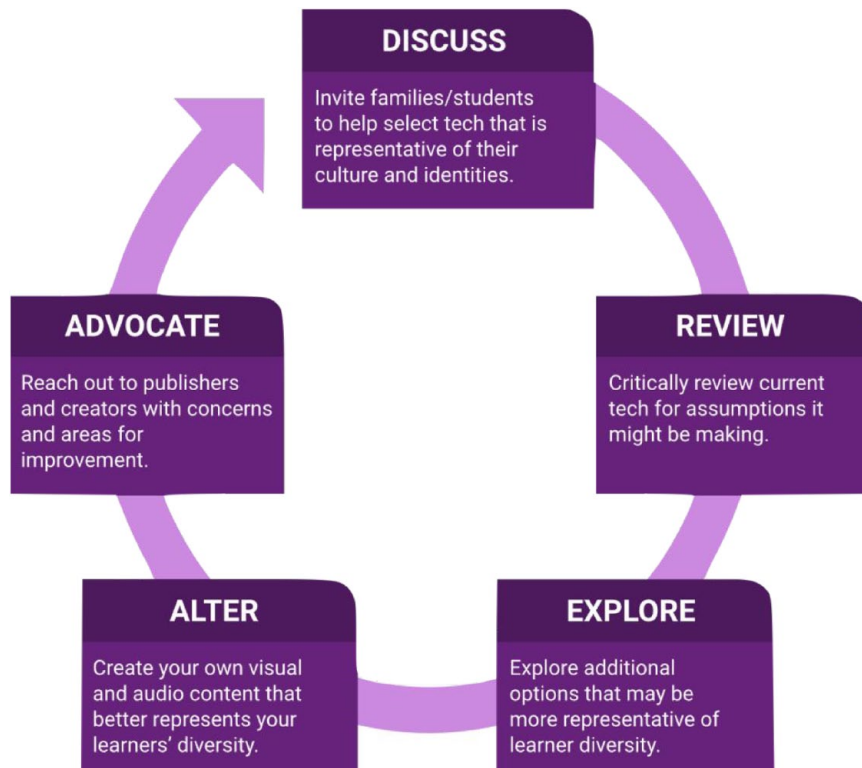
Recommendation 4: Maintain a Proactive DEI Agenda

Establish a group of diverse individuals in your school or organization to create and implement a proactive DEI agenda that includes professional development and actionable steps to move toward more culturally responsive and sustaining technology integration as part of assistive technology implementation. To begin, follow these steps:

1. **Write a DEI vision statement:** Review your current vision statement for explicit presence of DEI values. Draft a new vision statement if needed.
2. **Set goals based on the vision statement:** Consider both short- and long-term goals that support your vision.
3. **Create action steps to work toward those goals:** Identify multiple ways in which you can begin to actualize those goals.
4. **Aim for continuous feedback and improvement:** Gather input from key stakeholders in multiple ways and revisit goals regularly.

In the past year, ISET recognized a need to be more intentional in the way we support the intersectional diversity of students with disabilities. ISET recently published an initial DEI agenda with the

Figure 3 Reflective cycle for selecting technologies representative of diverse learners



intention of weaving DEI into all of our work (McMahon & Hollingshead, 2021). To be antiracist technology innovators, we need to ensure technology implementation actions are not increasing the digital divide and creating additional barriers for diverse learners who have disabilities. A true social justice reform movement in education requires educators and related service personnel to recognize the intersectionality of educational rights for people with disabilities as part of a much larger and interconnected social justice movement. Chardin and Novak (2021) emphasize how UDL aligns with social justice work if we explicitly (a) identify barriers, (b) embrace variability, (c) reflect on biases, (d) expect discomfort, (e) amplify student voice, and (f) take action.

Part of this action will require sustained outreach and collaborative efforts because diverse input and representation matters. Johnson (2004) outlined this need:

Educators committed to inclusivity need to work collaboratively to ensure

that efforts to address the diverse experiences and learning needs of students will not simply reproduce the relations of inequality, but rather work as a set of operating principles that will assist in achieving social justice. (p. 151)

At the next faculty meeting, Ms. Wilson and Mr. Patil shared about their experience collaborating with specialists and students to incorporate technology to supporting diverse classroom needs. While they celebrated their success, they acknowledged the room for growth and the barriers that made this a challenge, including insufficient planning time for collaboration and a need for additional resources and professional development about the kinds of tools available to them. The district educational technology specialist decided to form an ad hoc committee to set some goals and action steps that could make this type of collaborative technology problem-solving a more realistic support for teachers and for students.

Call to Action

While ISET strongly supports the need for deeper examination of the complex

interactions of technology, disability, and intersectionality to support diversity, equity, and inclusion, it calls on educators to regard accessibility limitations of commonly used instructional technologies to remove technology-related barriers and ensure equitable access. With the overarching goal of weaving DEI into the fabric of practices, educators should (a) create accessible materials from the onset, (b) factor intersectional diversity in AT consideration, (c) select technology that is reflective of the users' diversity, and (d) maintain a proactive DEI agenda to ensure technology serves as a solution and move toward inclusive technology integration. Finally, ISET calls on educators to systematically evaluate the most commonly used assistive technology evaluation processes and propose enhancements to ensure they are designed with the lens of culturally responsive and sustaining pedagogy. ISET is proud to be part of the Council for Exceptional Children and is committed to continuing to work on designing a more inclusive future for all learners.

Resources

- **CAST** | <https://www.cast.org/> | Website for the nonprofit education research and development organization that created the Universal Design for Learning (UDL) framework and UDL Guidelines.
- **World Wide Web Consortium** (W3C) Web Accessibility Initiative | <https://www.w3.org/WAI/> | Website includes strategies, standards, and resources to make the web accessible to people with disabilities.
- **National Educational Technology Plan** (NETP) | <https://tech.ed.gov/netp/> | This U.S. policy document articulates a vision of equity, active use, and collaborative leadership to make everywhere, all-the-time learning possible. While acknowledging the continuing need to provide greater equity of access to technology itself, the plan goes further to call on all involved in American education to ensure equity of access to transformational learning experiences enabled by technology.

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