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Educational Technology

A Call to Action for Closing the Digital Access, Design, and Use Divides

2024 National Educational Technology Plan

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Contents

Acknowledgments

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Introduction

In its simplest terms, the instructional core is composed of the teacher and the student in the presence of content. It is the relationship between the teacher, the student, and the content – not the qualities of any one of them by themselves – that determines the nature of instructional practice, and each corner of the instructional core has its own particular role and resources to bring to the instructional process. Simply stated, the instructional task is the actual work that students are asked to do in the process of instruction – not what teachers think they are asking students to do, or what the official curriculum says that the students are asked to do, but what they are actually asked to do.

City, Elizabeth A., Richard Elmore, Sarah Fiarman, and Lee Teitel
Instructional Rounds in Education, 2009

Technology can be a powerful tool to help transform learning. It has the potential to empower students to expand their learning beyond the confines of the traditional classroom, support self-directed learning, help educators tailor learning experiences to individual student needs, and support students with disabilities. Technology also has the potential to allow students and educators to collaborate with peers and experts worldwide, engage with immersive learning simulations, and express their learning creatively. Furthermore, it has the potential to collect student performance and engagement data, providing insight into student progress and allowing educators to deploy targeted support.

Yet, as researcher Justin Reich noted, "Predictions of imminent transformation are among the most reliable refrains in the history of educational technology."[1] And, across that history[2] and present-day classrooms, it has failed to realize this full potential. Where technology has realized its potential, it is often for a small minority of learners and contributes to growing inequities.[3] [4] [5] Similarly, educational technology (edtech) tools sometimes claim (without independent, research-based evidence) that student assessment results will soar if school systems adopt a given digital resource. Such claims are not only misleading, but they can undermine the true potential of edtech. Reliance on a specific tool to accelerate learning or deliver a comprehensive and rigorous education for every student places all responsibility on the content.[6] It ignores educators and students and the relationships between all three.

1 (2020). *Failure to Disrupt: Why Technology Alone Can't Transform Education* (1st ed.). Harvard University Press. https://www.hup.harvard.edu/catalog.php?isbn=9780674089044
2 Cuban, Larry. *Oversold and Underused: Computers in the Classroom*. Cambridge, Mass.: Harvard University Press, 2001.
3 (2017, October). *From Good Intentions to Real Outcomes: Equity by Design in Learning Technologies*. Connected Learning Alliance. Retrieved September 7, 2023, from https://clalliance.org/publications/good-intentions-real-outcomes-equity-design-learning-technologies/
4 Attewell, P. (2001). Comment: The first and second digital divides. *Sociology of Education*, 252-259.
5 Reinhart, J. M., Thomas, E., & Toriskie, J. M. (2011). K-12 teachers: Technology use and the second level digital divide. *Journal of Instructional Psychology*, 38.
6 City, Elizabeth A., Elmore, R., Fiarman, S., & Teitel, L. (2009). Instructional rounds in education. Harvard Educational Publishing Group.

Somewhere between the promise of transformation and the barriers to realizing that promise lies the potential for states, districts, and schools to build systems that better ensure that edtech's promise is afforded to all students, no matter their geography, background, or individual context.

This 2024 National Educational Technology Plan (NETP) examines how technologies can raise the bar[7] for all elementary and secondary students. It offers examples of schools, districts, classrooms, and states doing the complex work of establishing systemic solutions to inequities of access, design, and use of technology in support of learning. The identification of specific programs or products in these examples is designed to provide a clearer understanding of innovative ideas and is not meant as an endorsement.

7 (n.d.). *Raise the Bar: Lead the World*. U.S. Department of Education. Retrieved September 7, 2023, from https://www.ed.gov/raisethebar/

Digital Divides

Building on the concept of the instructional core, this plan considers the barriers to equitable support of learning through edtech as three divides:

1. **Digital Use Divide:** Inequitable implementation of instructional tasks supported by technology. On one side of this divide are students who are asked to actively use technology in their learning to analyze, build, produce, and create using digital tools, and, on the other, students encountering instructional tasks where they are asked to use technology for passive assignment completion. While this divide maps to the student corner of the instructional core, it also includes the instructional tasks drawing on content and designed by teachers.
2. **Digital Design Divide:** Inequitable access to time and support of professional learning for all teachers, educators, and practitioners to build their professional capacity to design learning experiences for all students using edtech. This divide maps to the teacher corner of the instructional core.
3. **Digital Access Divide:** Inequitable access to connectivity, devices, and digital content. Mapping to the content corner of the instructional core, the digital access divide also includes equitable accessibility and access to instruction in digital health, safety, and citizenship skills.

As a path to closing these divides, the NETP also provides actionable recommendations to advance the effective use of technology to support teaching and learning. The recommendations in each section are also followed by tags identifying whether they are most immediately intended for states, districts, or school buildings. These recommendations are meant as components of solutions that bridge each divide but cannot comprise all of what is necessary within a given geography, culture, or context. Throughout each section, examples are offered of states, school districts, and schools engaged in the work of putting these recommendations into practice.

Many schools in the United States are equipped with greater connectivity and access to devices and digital learning resources than ever before as a result of the need for emergency remote learning brought about by the COVID-19 pandemic. However, this continued bridging of the access divide will only add to the failure of edtech to deliver on its promises if systems do not consider its use in conjunction with all components of the instructional core. This NETP attempts to chart a path for all schools, educators, and students to realize the potential of technology in supporting better "everywhere, all-the-time" learning.

the Digital Use Divide

The Digital Use Divide stands between those students who are asked to use technology for creation, exploration, and critical analysis and those who are not.

As discussed in the 2017 National Educational Technology Plan, a divide exists between those students who regularly encounter opportunities to leverage technology in active, critical, and creative ways and those whose experiences with technology in their learning are limited to more passive expectations of use. Some students experience a school year full of critical media analysis, video and podcast creation, real-world data collection, connections with remote content area experts, and authentic opportunities to share their learning with global audiences.

Other students—often students from historically marginalized backgrounds—have very different experiences with technology.[8] [9] [10] [11]They are guided towards more limited engagements that frame them as passive technology users. They have school years of digital worksheets, point-and-click assessments, locked-down devices, and penalties for organic collaboration. In some cases, they may have access to more technology than their peers on the other side of the divide but seldom have opportunities to use that technology in formal education beyond digitized versions of practices of classrooms of a century ago.

Closing this digital use divide— ensuring all students have transformative, active, creative, critically thoughtful experiences supported by technology— is the focus of the following section. Beginning with a clear vision of what states and districts want for all graduates, it then offers guidance and recommendations for operationalizing, evaluating, and systematizing the experiences necessary for all students to fulfill that vision.

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8 Fishman, B., Dede, C., & Means, B. Teaching and technology: New tools for new times. In D. Gitomer & C. Bell (Eds.), Handbook of Research on Teaching (5th edition.)

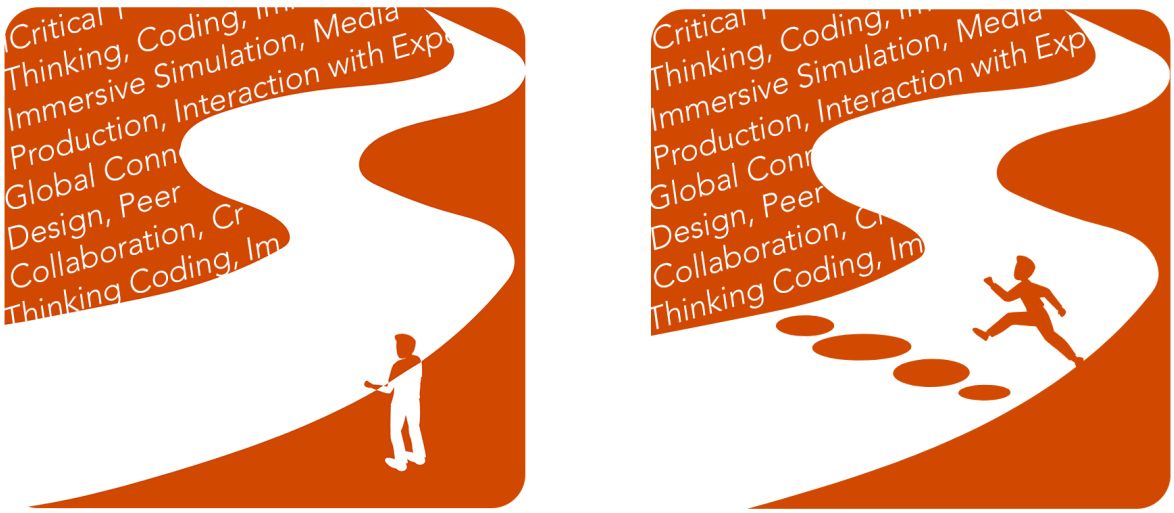
9 Valadez, J. R., & Durán, R. P. (2007). Redefining the digital divide: Beyond access to computers and the Internet. The High School Journal, 90(3), 31–44.

10 Warschauer, M., & Matuchniak, T. (2010). New technology and digital worlds: Analyzing evidence of equity in access, use, and outcomes. Review of Research in Education, 34(1), 179–225.

11 Albert D. Ritzhaupt, Feng Liu, Kara Dawson & Ann E. Barron (2013) Differences in Student Information and Communication Technology Literacy Based on Socio-Economic Status, Ethnicity, and Gender, Journal of Research on Technology in Education, 45:4, 291-307, DOI: 10.1080/15391523.2013.10782607

Recommendations for Closing the Use Divide

1. **Develop a "Profile of a Learner/Graduate" outlining cognitive, personal, and interpersonal competencies students should have when transitioning between grade levels and graduation.** (States, Districts)
2. **Design and sustain systems, including needs assessments, technology plans, and evaluation processes supporting the development of competencies outlined in the "Profile of a Learner/Graduate" through the active use of technology to support learning.** (States, Districts, Schools)
3. **Implement feedback mechanisms that empower students to become co-designers of learning experiences.** (Districts, Building-Level Administrators)
4. **Develop rubrics for digital resource and technology adoptions to ensure tools are accessible and integrated into the larger educational ecosystem, support Universal Design for Learning (UDL) principles, and can be customized in response to accommodation or modification needs of learners with disabilities.** (States, Districts, Building-Level Administrators)
5. **Review subject area curricula or program scopes and sequences to ensure that student learning experiences build age-appropriate digital literacy skills through active technology use for learning.** (States, Districts)
6. **Build public-private partnerships with local businesses, higher education institutions, and nonprofit organizations to help students access edtech-enabled hands-on learning and work-based learning experiences.** (States, Districts)
7. **Provide professional learning and technical assistance to district leaders, building-level administrators, and educators to support the use of evidence to inform edtech use.** (States, Districts)
8. **Develop guidelines for emerging technologies which protect student data privacy and ensure alignment with shared educational vision and learning principles.** (States, Districts)



Closing the Digital Use Divide

Leveraging Technology to Meet the Needs of All Learners

In 2023, to better meet the needs of their community, the Bartholomew Consolidated School Corporation (BCSC) in Indiana began its journey with UDL, a research-driven framework to improve and optimize teaching and learning by reducing barriers in instruction and addressing individual differences, learning preferences, abilities, and backgrounds (see page 12 for a deeper dive into UDL). The goal of creating more inclusive and accessible learning environments for all learners now serves as the foundation for all the district's work. In recent years, the district expanded its UDL implementation by adopting a district-wide learning management system and a 1:1 student-device ratio in grades K-12.

UDL has helped guide the purposeful and innovative use of edtech in BCSC. UDL practitioners regularly reflect upon the learning environment and consider what additional options could make the environment more accessible, engaging, and meaningful to learners. Rather than integrate technology for its own sake in a one-size-fits-all manner, UDL encourages teachers to implement technology to provide options for engaging learners, present content that supports diverse languages and sensory needs, and demonstrate understanding. When entering a BCSC classroom, it is common to see students using options the teacher has designed to accomplish their learning goals. These options could include reading, working with manipulatives, listening to audiobooks, watching videos, going through modules on their devices, working with other students, or having time with a teacher or assistant. The goal is always the priority, not how students accomplish it.

Additionally, UDL, coupled with technology, has transformed how students demonstrate their understanding by creating an environment where learners have options and act as the architects of their own learning. In one history class, UDL and tech empowered BCSC multilingual learners showed their understanding of topics by creating multimedia-rich eBooks with text, audio, and video recordings in multiple languages. Other learners created a series of explainer videos, while other students opted to write an essay on the same history topic with speech-to-text tools. The students not only had flexible and engaging options to display content knowledge beyond traditional assessments but also could share their knowledge with a broader, relevant audience by publishing their work for viewing by parents, families, other teachers, and the community.

To ensure the consideration of UDL in the procurement process, the BCSC developed UDL-based evaluation rubrics for all curriculum, textbook, and technology adoptions. The district uses rubrics to evaluate resources for critical accessibility features such as text-to-speech, language and translation options, font adjustments, color contrasts, and additional web accessibility standards. These rubrics have led to the adoption of accessible paper and digital resources for curriculum, devices, and other learning materials, ensuring that stakeholders consistently focus on the diversity of end users.

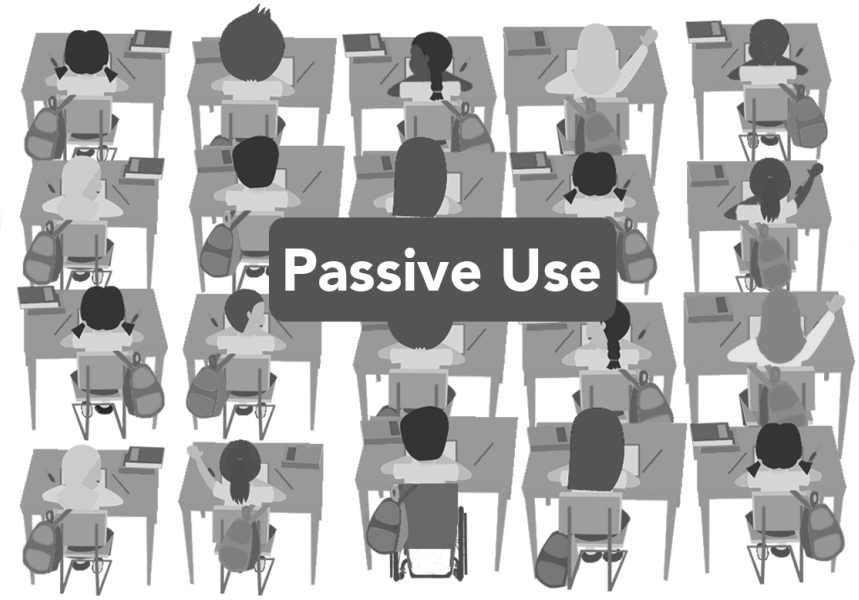
Collaboration and regular meetings between different technology department subdivisions have helped ensure all staff recognize and value the district's commitment to UDL. The technology department regularly collaborates with key district leadership groups to better support each others' work, such as elementary curriculum, secondary curriculum, multilingual learning, and special education. In addition, diverse stakeholder groups that mirror BCSC's ever-diversifying community populations are critical players in the success of their UDL implementation. When exploring edtech, the district solicits input from teaching staff, classified staff, students, and families in its stakeholder engagement process.

Beginning more than 20 years ago, BCSC began the systemic, intentional work of closing the digital use divide for all learners.

Re-Defining the Digital Use Divide

From the printing press to streaming video tutorials, the history of edtech is littered with claims of imminent, disruptive transformation. These prognostications often imply that the advent of technology is sufficient for realizing this transformational potential. However, technology alone has yet to prove adequate to improve education for all students. Marshaling technology in support of learning can be most effective when that technology is in the service of common visions of student learning. However, not all students can access the same high-quality learning experiences. Technology can be deployed in classrooms almost as an afterthought for many students, with little understanding of how best to use it. What is often identified as "professional learning" regarding technology for educators can often be little more than training on basic functions such as entering rosters, generating reports, or assigning prefabricated tasks. The human, in these instances, is taken out of the loop.[12]

The 2017 NETP defined the digital use divide as the disparity between students who use technology to create, design, build, explore, and collaborate and those who are only invited to consume media passively.[13]



Students use technology for passive assignment completion.

Passive Use includes activities such as filling out digital worksheets or consuming digital content without accompanying reflection, imagination, or participation.

The plan noted, "Without thoughtful intervention and attention to the way technology is used for learning, the digital use divide could grow even as access to technology in schools increases." While the field made strides toward more active use for all in subsequent years, 2020 halted many of these efforts. It also expedited the proliferation of technologies and connectivity on a scale and speed for which many districts and schools were unprepared. Although this switch to emergency remote learning necessitated by the COVID-19 pandemic and emergency federal funding undoubtedly helped narrow the digital access divide, it did not close the digital use divide.

12 May 2023. *Artificial Intelligence and the Future of Teaching and Learning*. U.S. Department of Education, Office of Educational Technology. Retrieved August 24, 2023 from https://tech.ed.gov/ai-future-of-teaching-and-learning/

13 January 2017. *Reimagining the Role of Technology in Education: 2017 National Education Technology Plan Update*. U.S. Department of Education, Office of Educational Technology. Retrieved August 15, 2023, from https://tech.ed.gov/files/2017/01/NETP17.pdf

Students use technology to think critically, build, produce, communicate, collaborate, and create digital content.

Active Use involves critical thinking and includes activites such as coding, immersive simulations, media production, interaction with experts, making global connections, design, and peer collaboration.

In addition to hardware, recent years marked a swell of digital learning resources. During the 2019–2020 school year, a LearnPlatform survey found that school districts used an average of 895 digital tools,[14] and a U.S. Department of Education survey found that 45 percent of schools reported having a computer for each student.[15] By comparison, in 2023, a LearnPlatform survey found that school districts used an average of 2,591 edtech tools in the 2022–23 school year.[16] Ninety percent of educators surveyed by the EdWeek Research Center responded that 90 percent of educators said there was at least one device for every middle and high schooler by March 2021 (84 percent said the same about elementary school students).

Because school systems deployed so much technology on an emergency basis without the benefit of thoughtful planning, change management, or in the service of shared goals, many school systems are struggling to make the most of these new technologies.[17] In a 2021–2022 Project Tomorrow Speak Up Survey of over 41,000 students nationwide, 84 percent of grade 6-12 students reported that the number one way they are using new technology in school is for taking online tests or quizzes.[18] The subsequent most frequent

14 Merod, A. (2023, July 10). *Districts used 2,591 ed tech tools on average in 2022-23. K12 Dive*. Retrieved August 15, 2023, from https://www.k12dive.com/news/school-districts-ed-tech-use/685995/

15 Gray, C., & Lewis, L. (2021, November 26). *Use of Educational Technology for Instruction in Public Schools: 2019–20*. U.S. Department of Education, National Center for Education Statistics. Retrieved August 15, 2023, from https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2021017

16 (n.d.). *The EdTech Top 40: A Look at K-12 EdTech Engagement During the 2022-23 School Year*. Instructure. Retrieved August 15, 2023, from https://www.instructure.com/resources/research-reports/edtech-top-40-look-k-12-edtech-engagement-during-2022-23-school-year

17 Prothero, A. (2023, March 27). *How Educators Feel About the Impact of Technology, in Charts*. Education Week. Retrieved August 15, 2023, from https://www.edweek.org/technology/how-educators-feel-about-the-impact-of-technology-in-charts/2023/03

18 Beyond the Classroom Today: From Increasing Technology Access to Improving Student Learning Experiences. Project Tomorrow, Retrieved August 21, 2023 from https://thejournal.com/whitepapers/2023/07/spectrum-beyond-the-classroom/asset.aspx?tc=assetpg&tc=page0

uses of technology, as reported by students, were creating documents to share (63 percent), emailing teachers with questions (55 percent), and watching online videos (52 percent). While all those are valid uses of technology to support instruction, for the most part, they reflect technology as a passive substitution for traditional teaching practices. These examples are far from the vision of technology "as a tool to engage in creative, productive, lifelong learning."

Active use of technology utilizes technology to discover, analyze, and apply learning rather than passively receiving information.[19] It can empower students to take ownership of their learning, collaborate with peers, and use their skills practically and meaningfully. It reveals voice and choice in the learning process while enhancing engagement, critical thinking, creativity, and problem-solving abilities, preparing students for success in a technology-driven world.[20] [21] [22] [23] With active use, students frequently engage in self-directed, interest-driven learning using technology outside of school as well, and these learning experiences are representative of their preferences for how learning should be in the classroom.[24]

Passive technology use occurs when students consume digital content or interact with technology in a primarily observational or non-interactive manner. This technology use is less engaging and may not require active participation or student contribution. It may include activities like test prep applications focusing on rote memorization or completing digitized worksheets online without immediate feedback. During the pandemic, many students used technology for emergency remote learning in passive ways, which did not necessarily result in high-quality learning experiences.[25] [26] Because school systems deployed technology on an emergency basis, many teachers did not have the time or capacity to design effective online learning environments; in many cases, teachers transferred over traditional lesson plans and structures to a virtual environment, with varying degrees of success.[27] Post-pandemic, teachers and students still use many new digital tools, but not necessarily in ways that foster active technology use.[28] [29]

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19 University of South Florida (n.d.). *Active Learning*. Florida Center for Instructional Technology. Retrieved August 15, 2023, from https://fcit.usf.edu/matrix/project/active-learning/

20 Taylor, S. (2015). Powering up Technology from Passive Access to Active Integration. Odyssey: New Directions in Deaf Education, 16, 60-63. https://eric.ed.gov/?id=EJ1064238

21 Romero, M., Laferriere, T., & Power, T. M. (2016). The Move is On! From the Passive Multimedia Learner to the Engaged Co-creator. ELearn, 2016(3). https://doi.org/10.1145/2904374.2893358

22 Cardullo, V. M., Wilson, N. S., & Zygouris-Coe, V. I. (2018). Enhanced Student Engagement Through Active Learning and Emerging Technologies. IGI Global. https://doi.org/10.4018/978-1-5225-2584-4.ch019

23 Ntulli, E. (2015). Active Learning Strategies in Technology Integrated K-12 Classrooms. Handbook of Research on Educational Technology Integration and Active Learning. https://doi.org/10.4018/978-1-4666-8363-1.ch007ss

24 Evans, J. A. (2023). *Free Agent Learning, Leveraging Students' Self-Directed Learning to Transform K-12 Education* (1st ed.). John Wiley & Sons. https://www.tomorrow.org/publications/free-agent-learning/

25 West, M. (2023). An ed-tech tragedy? Educational technologies and school closures in the time of COVID-19. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000386701

26 Effects of the COVID-19 Pandemic on K-12 Education: A Systematic Literature Review. Educational Research and Development Journal, 24(1), 53-84.

27 Kamenetz, Anya. The Stolen Year: How COVID Changed Children's Lives, and Where We Go Now. Hachette UK, 2022.

28 Holland, Beth (July 2022). From Digital Access to Digital Equity: Critical Barriers That Leaders and Policymakers Must Address to Move Beyond "Boxes & Wires" https://practices.learningaccelerator.org/artifacts/from-digital-access-to-digital-equity-critical-challenges-that-leaders-and-policymakers-must-address-to-move-beyond-boxes-wires Retrieved August 25, 2023.

29 UNESCO. (2023). Global education monitoring report 2023: Technology in education – A tool on whose terms? https://unesdoc.unesco.org/ark:/48223/pf0000386165ss

Decades of research from the learning sciences have shown the importance of considering individual learner variability and encouraging active learning experiences.[30] Technology has the potential to support learner needs and create learning opportunities in ways that we could not have imagined 40 years ago, but only when paired with the understanding of how learning can and should look different in the present. Without thoughtful consideration of the learning goals to be supported by technology use and what that should look like, the digital use divide will continue to grow and exacerbate existing inequities already worsened by the pandemic.[31] [32] [33]

30 National Academies of Sciences, Engineering, and Medicine. 2018. How People Learn II: Learners, Contexts, and Cultures. Washington, DC: The National Academies Press. https://doi.org/10.17226/24783.

31 Prothero, A. (2021, July 9). *How COVID taught America about inequity in education*. Harvard Gazette. Retrieved August 15, 2023, from https://news.harvard.edu/gazette/story/2021/07/how-covid-taught-america-about-inequity-in-education/

32 (2021, June 8). *Education in a Pandemic: The Disparate Impacts of COVID-19 on America's Students*. U.S. Department of Education Office for Civil Rights. Retrieved August 15, 2023, from https://www2.ed.gov/about/offices/list/ocr/docs/20210608-impacts-of-covid19.pdf

33 Toness, B. V., & Lurye, S. (2022, October 28). *How COVID taught America about inequity in education*. The Hechinger Report. Retrieved August 15, 2023, from https://hechingerreport.org/massive-learning-setbacks-show-covids-sweeping-toll-on-kids/

Sparking Interest in STEAM Education Through Student Choice and Project-Based Learning

Pendergast Elementary School District (PESD) in Glendale, AZ, has pursued the ambitious goal of developing a district-wide, student-centered, project-based learning culture. The district implemented the use of FUSE Studios, a research-based STEAM platform created by and housed within Northwestern University and funded by the Macarthur Foundation and National Science Foundation, among others, to support this goal. FUSE Studios puts student interest and agency at the center of its approach. Instead of moving all students through the same adult-selected tasks at the same time in the same sequence, students using FUSE Studios choose instead from among more than 30 leveled challenge sequences in areas such as 3D design and printing, digital animation, robotics, and making-with-electronics projects.

In-depth classroom research has shown that students develop essential 21st-century skills in FUSE; they learn to persist, teach and learn from their peers, and be adaptive problem-solvers.[34] [35] [36] [37] This research has also shown students genuinely enjoy their learning experiences in FUSE, which has implications for their choices about future STEM activities.

Now in its 12th year, FUSE Studios has grown through word-of-mouth from a small demonstration project to a program implemented in more than 250 schools in the United States and abroad, and serving more than 50,000 young people during the 2022–23 school year. The majority of students using FUSE are from historically marginalized student populations.

34 Ramey, K. & Stevens, R. (2020). Best Practices for Facilitation in a Choice-based, Peer Learning Environment: Lessons from the Field. In Gresalfi, M. and Horn, I. S. (Eds.), The Interdisciplinarity of the Learning Sciences, 14th International Conference of the Learning Sciences (ICLS) 2020, Volume 4 (pp. 1982-1989). Nashville, Tennessee: International Society of the Learning Sciences.

35 Ramey, K. E., Stevens, R., & Uttal, D. H. (2020). In-FUSE-ing STEAM learning with spatial reasoning: Distributed spatial sensemaking in school-based making activities. Journal of Educational Psychology, 112(3), 466–493. https://doi.org/10.1037/edu0000422

36 DiGiacomo, D.K., Van Horne, K. and Penuel, W.R. (2020), "Choice and interest in designed learning environments: the case of FUSE Studios", Information and Learning Sciences, Vol. 121 No. 3/4, pp. 137-154. https://doi.org/10.1108/ILS-09-2019-0098

37 Jaakko Hilppö, Reed Stevens, "Failure is just another try": Re-framing failure in school through the FUSE studio approach. International Journal of Educational Research, Volume 99, 2020, https://doi.org/10.1016/j.ijer.2019.10.004

Resetting Destination: Portrait of a Learner/Graduate

Amid this new connectivity, influx of devices, and swell of digital learning resources lies an opportunity to cast a clearer vision of what communities want for the learning of their young people. Before implementing edtech, states and school systems have the opportunity to set a clear vision of cognitive, personal, and interpersonal competencies students should have when they transition between grade levels and at graduation. BCSC's vision was formed by its clear commitment to UDL as a pedagogical framework supported by the active use of technology for learning. In other states and districts, this vision is often called the Portrait of a Learner or Portrait of a Graduate, which serves as a guiding framework that influences curriculum, instruction, assessment, and overall educational design. The NETP will use the term "Portrait of a Learner/Graduate" to describe the entirety of the K-12 journey, a portrait that changes as students progress through grade levels.

Whether at the state or district level, developing a Portrait of a Learner/Graduate involves soliciting input from various stakeholders— educators, parents/guardians, local business owners, colleges and universities, workforce development organizations, and community members. This development process can foster a sense of shared responsibility and ownership and ensure the final vision aligns with community needs.

Development of a Portrait of a Learner/Graduate pushes all involved to articulate the full range of outcomes they want for their graduates. Although the specific skills outlined in a Portrait of a Learner/Graduate can vary based on individual states' or school systems' values and goals, they often include "soft skills" such as critical thinking, problem-solving, communication, collaboration, creativity, and digital literacy. These transferable skills are often highly valued by employers across industries and help prepare students for college or careers, and

Painting a Statewide Portrait of a Graduate in Nevada

Seldom is there the opportunity to read the story of the creation of a portrait. The Nevada Department of Education (NDE) has provided one by making the process by which the state is crafting its "Portrait of a Nevada Learner" public and transparent. Begun in October 2022 and drawing on work in Virginia, South Carolina, Utah, and New Mexico, Nevada's process serves as an example of ensuring input from as diverse and representative a sample of constituents as possible. Released in May 2023, the final portrait represents the input of thousands of Nevadans, including educators, students, and business leaders. The NDE undertook the effort in partnership with the Future of Learning Network. They began by asking a collection of 200 Nevadans to "envision the future of learning and identify portrait mindsets and skills." From there, the state sought feedback through surveys, pilot cohorts, and a youth fellowship program to allow for shared state-wide ownership. The state took the process one step further. It published documentation of the history and development of the portrait to inform Nevadans not involved in the process and as a potential template for states and districts looking to undertake similar projects.

The result of this multi-pronged, multi-sector, and multi-generational approach is a vision of the attributes Nevada learners "must possess to succeed both academically and in life, now and into a rapidly evolving future."

civic and community engagement.[38] [39] By explicitly defining the skills and attributes required for success in college, in the workforce, and in civic life, the Portrait of a Learner/Graduate helps prepare students for post-secondary opportunities and lifelong learning.

After articulating the full range of outcomes desired for their learners and graduates, educators and policymakers can work backward to build a school model and technology plan that maps directly to the identified outcomes. While developing a shared vision is an essential first step, execution may require redefining some critical assumptions regarding learning and how technology can and should support that vision. This process should include the thoughtful, intentional work of change management to help all education community members see what's possible.[40] [41] Frameworks for managing this transition to innovative learning include the Innovative Learning Implementation Framework from The Learning Accelerator, Change Management from Digital Promise, and The 4 Shifts Protocol.

38 McGunagle, D. and Zizka, L. (2020), "Employability skills for 21st-century STEM students: the employers' perspective", Higher Education, Skills and Work-Based Learning, Vol. 10 No. 3, pp. 591-606. https://doi.org/10.1108/HESWBL-10-2019-0148

39 Rios, J. A., Ling, G., Pugh, R., Becker, D., & Bacall, A. (2020). Identifying Critical 21st-Century Skills for Workplace Success: A Content Analysis of Job Advertisements. Educational Researcher, 49(2), 80–89. https://doi.org/10.3102/0013189X19890600

40 (2018). Co-Creating School Innovations: Should Self-Determination be a Component of School Improvement? T*eachers College Record: The Voice of Scholarship in Education*, 120, 1-32. https://api.semanticscholar.org/CorpusID:174770090

41 Depta, M. (2015). Best Practices in Implementation of Technology Change in the K-12 Context. *American Journal of Educational Research*, 3(12B), 41-56.

Rural District Leverages their Portrait of a Learner Through Competency-Based Education

Northern Cass School District 97, which serves 690 PK-12 students from six rural communities north of Fargo, North Dakota, is implementing competency-based education founded on its Portrait of a Learner. In 2017, the district embarked on a transformational journey driven in part by a specific challenge faced by many school systems: the problem of time. What started as a pilot program catalyzed a complete district redesign.

An essential element of Northern Cass's learning redesign is self-directed, flexible pacing. Within guidelines appropriate to their developmental level, learners can take the time needed to achieve proficiency on priority standards and provide three pieces of evidence to demonstrate that learning. The district learning management system allows educators to collect proof of proficiency and track learner progress toward meeting standards.

After embracing flexible pacing, the district changed its approach to grading, moving to a standards-based grading system that reflects a growth mindset.[42] [43] Standards-based grading considers evidence of learning and the data it produces differently from traditional grading scales. It measures students against specific skills and standards rather than on conventional measures, such as a percentage of coursework completed, making

42 Ng, B. (2018). The neuroscience of growth mindset and intrinsic motivation. Brain sciences, 8(2), 20.

43 Emily Rhew, Jody S. Piro, Pauline Goolkasian & Patricia Cosentino | Olympia Palikara (Reviewing editor) (2018) The effects of a growth mindset on self-efficacy and motivation, Cogent Education, 5:1, DOI: 10.1080/2331186X.2018.1492337.

it clearer where students are thriving and where they need help. With standards-based grading, failure and making mistakes are part of the learning journey. Students are given multiple opportunities to demonstrate mastery and have input as to how they show what they've learned.[44] Score levels of 1-4 (1: Emerging, 2: Foundational, 3: Proficient, 4: Extending) have replaced traditional letter grades and indicate progress toward achieving proficiency on priority standards. In this model, a score of 1 or 2 conveys not failure or deficiency but that the learner is still working toward mastery.

Cass's Portrait of a Learner emphasizes skills students need to succeed throughout life, regardless of their post-secondary path. The focus has shifted to "choice-ready" instead of "college-ready." Even the youngest learners start developing these skills in age-appropriate ways.

Before graduation, students complete a capstone presentation documenting how they built the skills outlined in the district's Portrait. Students have two options for showcasing evidence: they can focus on one competency from the Portrait and highlight multiple activities through which they demonstrated it, or choose to focus on one learning experience, such as an internship or a powerful school-based project and explore all the Portrait of a Learner skills they developed and demonstrated in its completion.

Although the transition to competency-based learning has taken several years, it empowers students with voice and choice in their education and provides them with the skills needed for post-graduation success.

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44 (2023, October 11). Traditional Grading Systems vs. Standards-based Grading Systems. KnowledgeWorks. Retrieved October 23, 2023, from https://knowledgeworks.org/resources/traditional-grading-vs-standards-based-grading/

Leveraging Technology to Support the Portrait of a Graduate in North Carolina

In October 2022, North Carolina Superintendent of Education Catherine Truitt announced the release of the North Carolina Portrait of a Graduate, developed in collaboration with close to 1,200 K-12 educators, administrators, families, employers, communities, and higher education institutions. The North Carolina Department of Public Instruction (NCDPI), in collaboration with educators and technologists from across the state, has also developed a comprehensible Digital Learning Plan aligned to the Portrait of a Graduate.

The Digital Learning Plan includes goals and rubrics for the state, Public School Units (PSUs), and schools that allow organizations to evaluate their progress and track students' growth. The NCDPI has developed a robust professional learning infrastructure to help educators and administrators leverage technology to develop the Portrait of a Graduate competencies. The state has adopted ISTE standards for students, teachers, administrators, and coaches, providing every educator with an ISTE membership. In addition, they sponsor educator cohorts to pursue ISTE educator certification. The state also pays for CoSN memberships for all PSUs and encourages PSU edtech leaders to pursue CoSN's Certified Education Technology Leader (CETL) certification. The NCDPI pays for interested edtech leaders to take the CoSN CETL course, and the annual NCTIES conference offers the CETL certification exam.

Using Digital Learning Initiative funds, the NCDPI launched a series of summer mini-conferences for educators called NCBOLD. The state provides teachers exemplifying best practices in digital teaching and learning with a stipend and travel funds to visit all eight state regions over two weeks to present free mini edtech conferences for educators. Attendees get CEU credit towards their teacher licensure renewal.

By aligning the Digital Learning Plan to the State Portrait of a Graduate and focusing on capacity building at the classroom, building, and PSU levels, the NCDPI is supporting a shared vision of student learning to help North Carolina students be truly prepared for civic life, careers, or college after graduation.

Universal Design for Learning Framing Active Use for All Learners

Effective and active use of technology incorporates the principles of Universal Design for Learning (UDL), a research-driven framework,[45] [46] [47] to improve and optimize teaching and learning for all people based on scientific insights into how humans learn.[48] UDL aims to make learning accessible and effective for all students by reducing barriers in instruction and addressing individual differences, learning preferences, abilities, and backgrounds. Developed to address the diversity of students' needs and to provide equal opportunities for learning and success, UDL emphasizes the need to design instructional materials, evidence-based learning activities, and assessments to maximize inclusivity and accommodate a wide range of learners. As such, the UDL framework supports an inclusive and equitable education environment for all learners by providing multiple flexibilities. UDL practice includes flexible presentations of content, flexible response options for students to demonstrate their learning, and flexible options for student engagement. UDL also incorporates appropriate accommodations, supports, and challenges for all students, including students with disabilities and students who are English language learners

While the following section will include a more detailed examination of how UDL can aid in the use of technology to support learning, the three main principles of UDL are outlined below.

45 Assor, A., Kaplan, H., & Roth, G. (2002). Choice is good, but relevance is excellent: Autonomy-enhancing and suppressing teacher behaviours predicting students' engagement in schoolwork. British Journal of Educational Psychology, 72(2), 261-278

46 Kalyuga, S., Chandler, P., & Sweller, J. (2000). Incorporating learner experience into the design of multimedia instruction. *Journal of Educational Psychology*, 92(1), 126-136.

47 Dalton, B. D., Herbert, M., & Deysher, S. (2003, December). Scaffolding students' response to digital literature with embedded strategy supports: The role of audio-recording vs. writing student response options. Paper presented at the 53rd Annual Meeting of the National Reading Conference, Scottsdale, AZ.

48 (n.d.). *About Universal Design for Learning*. CAST. Retrieved August 15, 2023, from https://www.cast.org/impact/universal-design-for-learning-udl

PRINCIPLES OF UDL	
Multiple means of representation	Digital tools can allow educators to present information in multiple ways. Examples can include videos, interactive simulations, infographics, and audio recordings. These tools allow students to access content in formats that suit their preferences. Accessibility features, such as closed captions, screen readers, text-to-speech, and adjustable font sizes, also support diverse learners.
Multiple means of expression	Digital tools can provide different ways for students to demonstrate their understanding of learning concepts. Examples include written assignments; audio or video presentations such as podcasts, screencasts, or movies; e-books; mind maps; and digital drawing tools. In addition, because technology allows students to learn outside of the traditional classroom setting, it can provide increased flexibility for students in alternative learning environments.
Multiple means of engagement	Digital tools can provide interactive learning experiences and multiple ways of engaging with learning material. Learners can be engaged or motivated to learn in a variety of ways. Factors influencing these individual variations include neurology, culture, personal relevance, subjectivity, and background knowledge, along with a variety of other factors.[49] Different types of multimedia content (audio, video, infographics, etc.) and the presentation of different content options can help students actively engage in the learning process. Technology can also facilitate collaborative learning experiences through discussion boards, virtual classrooms, and group projects, allowing students to work together and learn from one another.

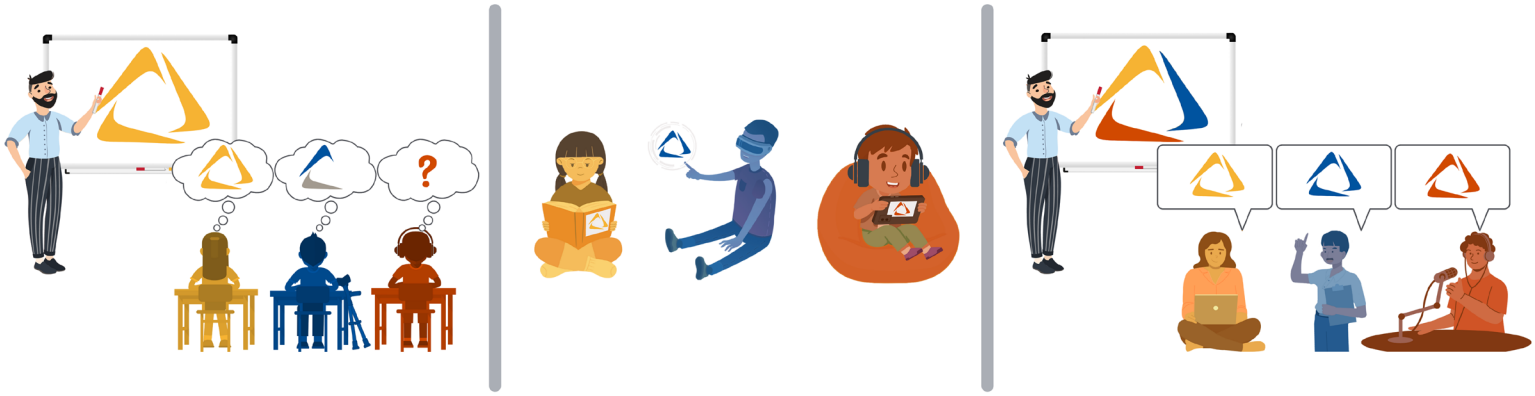
With the increasing number of digital learning tools and devices available to teachers post-pandemic, educators have even more options to support their use of UDL. Digital tools can offer more flexibility and learning support than traditional educational material formats. They empower educators to personalize and customize learning experiences to align with individual student needs while recognizing learner agency in charting the learning path that best meets these needs.

Educators can implement UDL without modern digital technology;[50] however, edtech is uniquely suited to support it. Including no-tech and tech-enabled choices for learners may be the best way to meet student needs. This flexibility extends to providing students with the option to use a variety of different digital and analog tools to demonstrate their learning. Rather than teachers feeling like they need to be experts on a specific digital tool before including it in the classroom, they can instead allow students to use the tool or tools of their choice to demonstrate mastery of educational content if the final product demonstrates their understanding of the learning goal.

49 (n.d.). *Principle: Provide Multiple Means of Engagement*. CAST. Retrieved September 5, 2023, from https://udlguidelines.cast.org/engagement

50 Rose, D. H., Gravel, J. W., & Domings, Y. M. (2012). UDL Unplugged: The Role of Technology in UDL. In T. E. Hall, A. Meyer, & D. H. Rose (Authors), Universal design for learning in the classroom: Practical applications (pp. 120-134). New York, NY: Guilford Press.

Universal Design for Learning (UDL) aims to make learning accessible and effective for all students by reducing barriers and supporting learner variability.



Teaching everything the same way supports unintentional barriers to learning.

In practice, UDL considers the design of learning materials, activities, and assessments to support a wide range of learners.

UDL starts with accessibility and considers multiple options for supporting engagement, understanding, and demonstration of learning.

Example Lesson Utilizing UDL and Technology: A Goal-Driven Unit

As an example of UDL, consider a fictional elementary school lesson created by Ms. Ramirez, who used UDL to develop a unit titled "EcoExplorers."[51] She started by identifying the unit's goal and considered the barriers that might emerge in the learning process. Ms. Ramirez considered how multiple means of representation, engagement, action, and expression might overcome these barriers.

The unit aimed to support all students in understanding ecological concepts associated with diversity and sustainability. To achieve this goal, Ms. Ramirez introduced the unit's goals and central question: "How can we protect and sustain our planet's diverse ecosystems?" She then reviewed the various tools and pathways students had to explore the topic.

In representing information, Ms. Ramirez leveraged technology to ensure all her students could access and understand the content. Some students chose to engage in an immersive 360-degree virtual tour of rainforests, while others, including a blind student, listened to narrated podcasts about aquatic ecosystems. Finally, some learners, including two students with learning differences, used interactive simulations that allowed them to manipulate ecosystem variables. The variety of provided resources ensured all students overcame the barriers to learning the essential content.

To actively engage students in their learning, Ms. Ramirez related the unit to previous units and encouraged students to take on the role of "EcoExplorers." She then reminded the students how to use the online collaboration tools for group projects, and students then chose different roles within the unit. Some students took on the role of scientist, some took on the role of engineer, while others took on the role of reporter. Across the different roles, students needed to gather information and develop solutions around critical challenges. The students gathered and organized their information through an online information organizing tool. Some designed infographics using graphic design software, while others created videos using tablets. By offering choice in technology tools, students contributed in ways that aligned with their strengths.

51 This example lesson was created by Technical Working Group member James Basham for the NETP based on the principles of UDL.

Thinking about how all students could act and express their understanding, Ms. Ramirez embraced diverse assessment methods. She tied all assessment methods back to assessment rubrics aligned to each engagement role and the unit's goal of understanding ecological concepts associated with diversity and sustainability. She walked the students through various options for demonstrating their understanding, including developing multimedia presentations, podcasts, written reports, or clay models. A couple of students then asked if they could develop a digital book with text, video, and visuals. Ms. Ramirez told students they could use any number of ways to demonstrate their understanding, including digital books. She then reminded the students to submit a self-completed rubric on their chosen expression of understanding. Encouraging students to reflect on their work helped students develop their executive functioning skills.[52] [53]

Using the UDL framework to design the unit, Ms. Ramirez supported all students in learning the content while helping them develop digital literacy and citizenship skills.

UDL Considerations for Educators

UDL principles, especially when combined with active technology use, can help educators better meet student learning needs. However, many policymakers, administrators, and educators do not understand the UDL framework and learner variability. Furthermore, few districts and schools provide educators the time to build their capacity to design educational experiences with that variability in mind. As a result, teachers' experience and training in classrooms may circumscribe student learning opportunities, even within the same school buildings. This difference in student learning opportunities is at the heart of the digital design divide.

The adults associated with an education system—whether educators, administrators, classified staff, policymakers, or parents/caregivers—tend to view education through their own experiences as students. Despite advances in learning science and the advent of technologies that empower educators to design learning experiences to meet the needs of diverse student populations, this information often does not make its way into schools. Instead, teachers often teach based on their own learning experiences.[54] Whether or not their educational experiences met their learning needs, changing practices without explicit training in new instructional models can be difficult. In addition, teachers need to experience these new instructional models as learners through ongoing professional training and teacher preparation programs. Unfortunately, many professional learning opportunities and teacher preparation programs are not designed using UDL principles nor provide teachers with opportunities to experience these new instructional models.

An additional challenge educators and administrators face in many school systems is that teachers are overwhelmed with responsibilities. Teachers may have only one 45-minute planning block per day—barely enough time to complete administrative tasks and answer emails, let alone design lessons that meet the needs of all learners. "Here's just one more thing" is a common refrain among educators with overflowing plates who are asked to take on additional tasks. Initiative fatigue often occurs when teachers, administrators, and educational institutions are subject to frequent changes in curriculum, teaching methods, assessment systems, and more, resulting in exhaustion and decreased effectiveness.[55]

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52 Lyons, K. E., & Zelazo, P. D. (2011). Monitoring, metacognition, and executive function: Elucidating the role of self-reflection in the development of self-regulation. Advances in child development and behavior, 40, 379-412.

53 Marcovitch, S., Jacques, S., Boseovski, J. J., & Zelazo, P. D. (2008). Self-reflection and the cognitive control of behavior: Implications for learning. Mind, Brain, and Education, 2(3), 136-141.

54 Cox, S. E. (2014). Perceptions and Influences Behind Teaching Practices: Do Teachers Teach as They Were Taught? [Master's Thesis, Brigham Young University]. https://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=6300&context=etds

55 How Collective Teacher Efficacy Develops. Educational Leadership, 76 (July 2019), 31-35. https://lceeq-files.s3.ca-central-1.amazonaws.com/cdn/2021-conference/handouts/C3-multiple+resources.pdf

Just as students need time and space to learn, grow, and reflect on their learning, so do educators. In short, school systems need to engage in what Justin Reich calls "the power of doing less"—taking the time to step back, eliminate non-essential activities, and provide teachers with the time to reflect on their professional practice.[56] In the words of author John Maxwell, "Learn to say 'no' to the good so you can say 'yes' to the best."

State and district policymakers and leaders can consider the following steps to develop systems that provide educators with the time, space, and capacity teachers need to become learning designers:

- Gain a working understanding of UDL and how to leverage it in the workplace and classroom.
- Plan for and intentionally model UDL in adult interactions and meetings and provide the necessary time for authentic learning/discussions.
- Engage and advocate for adequate connectivity and device access for educators and students at home and school to support learning and instruction.
- Partner and collaborate across agencies and departments to support UDL implementation.

Starting Small to Make a Difference in Mississippi

Engaging students in active use doesn't require an elaborate technological ecosystem. Pascagoula High School (PHS) is a suburban, Title 1 school on the Gulf Coast of Mississippi with a student population of around 1,120, about 70 percent Black or Hispanic. Educator Jami Sheets teaches a leadership class at PHS, which allows students to learn different leadership skills and put those skills into action on campus and in the community. The class's mission is to ensure all PHS students feel seen and heard. Sheets and her students identified the need to keep all PHS students "in the know" about school activities. During the 2022-23 school year Sheets' leadership class launched the Pascagoula News Network (PNN), a student-led weekly newscast, using only a tablet computer, a free graphic design platform, and a freely available streaming platform. Students were responsible for the newscast, which included developing a weekly content outline and writing, recording, and editing each segment under the guidance of Sheets.

The goal of the PNN is to highlight the entire student body, and it has quickly grown in popularity, with additional students inquiring as to how they can be involved in the project. As a result of this unintentional pilot of active technology use, Pascagoula included a broadcast journalism class during the district's first week-long intersession of the 2023-24 school year.

The experience demonstrates that educators can start with a small pilot, use existing technology tools, and build upon its success. After a successful start, Sheets, in collaboration with the library staff, applied for and received an Ingalls Shipbuilding STEM grant to get additional technology tools to support the broadcast.

56 Reich, J. (2022, October 1). The Power of Doing Less in Schools. ASCD. Retrieved September 6, 2023, from https://www.ascd.org/el/articles/the-power-of-doing-less-in-schools

- Support active technology use as a foundational UDL strategy.
- Advocate for equity of access to professional learning that is focused on UDL through sustained funding and policy priorities.
- Encourage teacher preparation and residency programs to implement UDL principles and support teachers as learning designers versus practitioners.
- Build on existing partnerships and relationships to develop and deliver professional learning opportunities leveraging UDL and technology.

Rural Kentucky District Empowers Teachers and Students to Be Active Learners

Shifting to active student use can also mean ensuring active teacher learning. Logan County Schools, a rural, high-poverty school system in Russellville, Kentucky, launched a digital transformation initiative in response to industry and community leaders who indicated that the local workforce needed graduates who were better innovators, communicators, and problem-solvers. The school system, a Digital Promise League of Innovative Schools member, wanted to ensure that teachers, principals, and administrators understood authentic student engagement and the importance of student choice and voice. The district hired digital learning coaches to make sure teachers, principals, and administrators received the resources and training to use technology in ways that supported these learning goals. At the same time, the teacher-leadership team (the LC Innovators) worked with the Learner-Centered Collaborative on embedding high-impact educator professional learning.

This initial investment in educator learning has shifted student experiences and expectations. Today, students in grades 5, 8, and 12 give a Defense of Learning Presentation at the end of the school year to reflect on their learning, share evidence and artifacts, and set new goals. Artifacts don't have to be from the classroom; they can be photos of a student leading an after-school club, captaining a sports team, or using math on the farm. The district also started an accountability system, sharing student growth, readiness, well-being, and performance data every quarter with the community.

Additional Technology Standards and Frameworks

States and districts have used several different technology standards and frameworks in conjunction with UDL to guide technology use in instruction. Examples include the SAMR Model,[57] [58] [59] the TPACK Framework,[60]

57 Puentedura, R. R. (n.d.). *SAMR: A Brief Introduction*. Hippasus.com. Retrieved August 16, 2023, from http://hippasus.com/rrpweblog/archives/2015/10/SAMR_ABriefIntro.pdf

58 Christopher N. Blundell, Michelle Mukherjee, Shaun Nykvist, A scoping review of the application of the SAMR model in research, Computers and Education Open, Volume 3, 2022, 100093, ISSN 2666-5573, https://doi.org/10.1016/j.caeo.2022.100093.

59 Terada, Y. (2020, May 4). *A Powerful Model for Understanding Good Tech Integration*. Edutopia. Retrieved August 16, 2023, from https://www.edutopia.org/article/powerful-model-understanding-good-tech-integration/

60 Kohler, M. J. (2012, September 24). *TPACK Explained*. TPACK.org. Retrieved August 16, 2023, from http://matt-koehler.com/tpack2/tpack-explained/

[61] [62] the PICRAT Model[63] and the ISTE Standards[64] (available for students, educators, education leaders, technology coaches, and computational thinking competencies). Standards and frameworks such as these can serve as examples for states and districts developing technology plans to align with their Portrait of a Learner/Graduate, Portrait of an Educator (described in the digital design divide section of this document), and Portrait of a Learning Environment (described in the digital access divide section).

61 Kendon, T., Ph.D., & Anselmo, L. (n.d.). *Technology, Pedagogy, and Content Knowledge (TPACK) Model*. Taylor Institute for Teaching and Learning. Retrieved August 16, 2023, from https://taylorinstitute.ucalgary.ca/resources/SAMR-TPACK#:~:text=Technology%2C%20Pedagogy%2C%20and%20Content%20Knowledge,to%20support%20how%20they%20teach

62 Stanford University (n.d.). *Technology Integration Framework*. Stanford Teaching Commons. Retrieved August 16, 2023, from https://teachingcommons.stanford.edu/teaching-guides/foundations-course-design/theory-practice/technology-integration-framework

63 Kimmons, R., Graham, C. R., & West, R. E. (2020). The PICRAT Model for Technology Integration in Teacher Preparation. *Contemporary Issues in Technology and Teacher Education (CITE Journal)*, 20(1). https://citejournal.org/volume-20/issue-1-20/general/the-picrat-model-for-technology-integration-in-teacher-preparation

64 (n.d.). *The ISTE Standards*. ISTE. Retrieved August 16, 2023, from https://www.iste.org/iste-standards

Atlanta Elementary School Designs Problem-Based Learning for Students

Spaces like STEAM labs, maker spaces, and innovation creation labs allow students authentic learning experiences that expose them to career paths, as well as settings where they can acquire essential skills such as collaboration and problem-solving. These spaces allow students to learn through thought and action when exposed to authentic contexts.[65] [66] This thinking drove the transformation of Atlanta Public Schools' M. Agnes Jones Elementary School (M.A. Jones), a Title 1 school serving a majority Black student population. The school was committed to having students develop solutions to local problems. Starting in kindergarten, students learn the Stanford Design School's engineering design process and practice it in science, English language arts, and math.

Students also put the process into practice. When 5th-grade students discovered insects were destroying a community garden near the school, they used the design process to tackle the issue. Through research, they learned bats eat thousands of flying insects every hour. The students also used AR/VR technology and TinkerCAD in the school's Innovation Creation Lab to design and build bat houses to bring more bats to the area. Along the way, students learned relevant and applicable facts about gardening, composting, nutrition, wellness, and sustainability.

At M.A. Jones, teachers, coaches, and even custodians participate in professional learning because school leaders recognize that building capacity is the only way to make this type of learning sustainable. By leveraging the active use of technology for solving real-world problems, M.A. Jones educators are helping close the digital use divide.

65 Sheridan, K., Halverson, E. R., Litts, B., Brahms, L., Jacobs-Priebe, L., & Owens, T. (2014). Learning in the making: A comparative case study of three makerspaces. *Harvard Educational Review*, 84(4), 505-531.

66 Ryan, J. O., Clapp, E. P., Ross, J., & Tishman, S. (2016). Making, thinking, and understanding: A dispositional approach to maker-centered learning. In *Makeology* (pp. 29-44). Routledge.

Considerations for Emerging Technologies

Educators who remember the advent of laser disk players or interactive whiteboards know that the adage of change as the only constant is true in edtech. Whatever the most cutting-edge technology in classrooms is today, tomorrow promises more improvements and innovations. These emerging technologies often promise increased engagement, transformation of the field, and increased learning outcomes. This can be alluring, but school systems should measure the potential benefits against potential student health, safety, and privacy risks. An important first step for districts is to set clear thresholds and expectations for including emerging technologies in learning spaces. They should also ensure all educators understand these guidelines and can measure their practices against them.

A Rural District Finds Ways to Make Computational Thinking Accessible to Everyone

It took three years for Talladega County Schools, a rural Alabama district with a student population of 7,000 that is roughly 67 percent White and 28 percent Black, to develop computing pathways for its 7,000 students. Talladega applied to participate in the National Science Foundation-funded Developing Inclusive K-12 Computing Pathways project to offer computer science and computational thinking (CT) opportunities to all students, particularly female students and students from low socioeconomic households. The district clarified the K-12 computing pathway and identified existing resources and gaps. Next, they defined new learning opportunities across grade levels, courses, and schools and developed a competency map linking CT-specific activities and resources.

To focus on classroom-level change, leaders first gathered teacher, administrative, student, and community feedback. They created professional development resources and determined how to measure pathway implementation progress. They also built a website that defined CT for parents and families. The district plans to revise its Inclusive CT Pathways document and website continually, and students will continue using "exit tickets" to help the district gain a better sense of student learning gains.[67]

67 Digital Promise. (2021). Defining computational thinking for a district: Inclusive computing pathways in Talladega County Schools. Digital Promise. https://doi.org/10.51388/20.500.12265/132

Building Pathways to Computer Science Success in Early County, Georgia

Before 2021, the Early County School District in Georgia had no Computer Science program for its students. Three years later, the district's high school will have four students complete its new computer science pathway. Through a partnership with the Kapor Center, the 52 percent Black school district has established a complete 6th through 12th-grade computer science pathway for students in Early County. They leveraged the Kapor Center's Culturally Responsive-Sustaining Computer (CRSC) Framework, developed in partnership with a national collective of education advocates to create more pathways for Black, Latinx, Native American, and other marginalized students to computer science education, tech careers, and STEM-related fields. The rural district faced challenges found in many similar districts across the country—lack of devices, the need for teachers with computer science certification, and a curriculum that helped students achieve industry-standard skills while considering culturally responsive practices. The goal of the partnership is to ensure that the students of Early County fulfill the Kapor Foundation's mission, "To create a more equitable technology ecosystem that addresses longstanding racial inequality, creates economic opportunity, tackles critical societal issues, and reflects the power and perspectives of communities of color."[68] [69]

68 (n.d.). Kapor Foundation. Kapor Center. Retrieved September 5, 2023, from https://www.kaporcenter.org/kapor-foundation/

69 Jean Ryoo, Gail Chapman, Julie Flapan, Joanna Goode, Jane Margolis, Christine Ong, Cynthia Estrada, Max Skorodinsky, Tiera Tanksley, Jamika D. Burge, Ryoko Yamaguchi, Frieda McAlear, Allison Scott, Alexis Martin, Sonia Koshy, Kamau Bobb, and Lien Diaz. 2019. Going Beyond the Platitudes of Equity: Developing a Shared Vision for Equity in Computer Science Education. In Proceedings of the 50th ACM Technical Symposium on Computer Science Education (SIGCSE '19). Association for Computing Machinery, New York, NY, USA, 657–658. https://doi.org/10.1145/3287324.3287331.

After addressing privacy and other concerns, one must consider the sometimes-brief lifespan of emerging technologies. Developers can move on from projects, or successful tools can be purchased by other companies and locked behind paywalls. A technology freely available to educators one day can be inaccessible the next. Districts like St. Vrain Valley Schools in Longmont, Colorado, developed a tiered approach to emerging technologies, such as the district's Innovative Tech Framework for evaluating emerging technologies. Such frameworks can help evaluate new technologies while helping educators understand which tools they can expect to be supported. While there is no "one size fits all" solution to address emerging technologies, there are some general principles that education leaders should keep in mind when considering new technologies. The following recommendations have been adapted from the Office of Educational Technology publication, Artificial Intelligence and the Future of Teaching and Learning:

Emphasize Humans in the Loop. Regardless of technologists' claims, no emerging technology will in and of itself solve the long-standing challenges faced by educational systems.[70] As new technologies emerge, educators must be involved in designing and developing digital tools for classroom use. Evaluating these technologies for potential classroom use at the state, school system, or school level should be iterative and include educator and student input. Evaluators should ensure tools are accessible and meet the needs of all students including students with disabilities. These evaluations should also consider how best to educate teachers, students, and families about these new technologies' potential benefits and risks. Educators should also keep in mind that technologies come and go - companies go bankrupt, get acquired by larger ones, or change their business focus or priorities, which is especially true of emerging technologies. By keeping this fact in mind, school systems can help prevent teachers from relying on tools that disappear.

1. **Align the Use of Emerging Technologies to Your Shared Vision for Education (State and District).** Every conversation about emerging technologies should start first and foremost with the educational needs and priorities of students, including discussions about educational equity. How might an emerging technology support the development of the skills outlined in your state's or district's Portrait of a Learner/Graduate? It is important not to let the excitement surrounding emerging technologies distract from the north star defined by your state or school system. When deploying emerging technologies in classrooms, evaluate their effectiveness against these priorities.
2. **Learning Principles Should Drive the Use of Emerging Technologies.** Consider how modern learning principles such as UDL can leverage emerging technologies. Pay particular attention to the needs of students from historically marginalized populations, including students who are English learners (ELs) and those with disabilities. Before deploying emerging technologies, consider learner variability and the diversity of settings in which teachers and students will use digital tools. New technologies developed and deployed without such considerations risk exacerbating the digital use divide instead of narrowing it.
3. **Develop Education-Specific Guidelines and Guardrails.** New data privacy and security risks can accompany the practical and powerful functionality of emerging technologies.[71] As with any edtech tool, evaluate emerging technologies to ensure they allow school systems to meet their federal and state legal obligations for protecting student data privacy and security. In addition, evaluate these tools to guard against the potential for bias, and to make sure they support cultural responsiveness, and educational equity. Creating an incubation framework for new and emergent technologies can help ensure alignment with these considerations.

70 Reich, J. (2020). *Failure to Disrupt: Why Technology Alone Can't Transform Education*. Harvard University Press.
71 U.S. Department of Education, Office of Educational Technology, Artificial Intelligence and the Future of Teaching and Learning, Washington, D.C., 2023.

Ethical AI Research: Automated Scoring Data Challenges for Open-Ended NAEP Items

The Institute of Education Sciences (IES), through its National Center for Education Statistics, administers the National Assessment of Educational Progress (NAEP), the largest national representative that offers continuing assessment of what America's students know and can do. NAEP uses open-ended prompts to measure student understanding more broadly than is possible in fixed-choice questions. However, these responses are time-consuming and expensive to score.

Automated Scoring uses natural language processing to "predict" human scores assigned to student responses. If sufficiently accurate, it can improve reporting timeliness, consistency control, and cost reduction. IES conducted two automated scoring challenges for reading and mathematics promts. These challenges were open to any research team that met data security requirements; winning teams came from assessment service providers and research institutions.

While this challenge achieved the technical goal of accurate scoring, the organizational and ethical requirements of the challenge were just as important. All challengers submitted a technical report that described algorithmic choices used, in order to ensure that solutions were clear and built trust in their validity. Further, a fairness/bias analysis was required to demonstrate that models were usable. For more information about the challenges, see the Challenge websites.

Improving Practice, Progress, and Proficiency

Once education leaders and policymakers have defined their vision for learners and implemented a framework to shift teacher practice (to be discussed further in the next section), building evidence about their efforts' success is important. With the more open-ended practices associated with active technology use, both qualitative measures (such as teacher narratives of adoption barriers) and quantitative measures (such as the frequency with which tools are used and student performance) can help education leaders describe implementation, monitor its progress, and adapt practices to better meet their implementation goals.

These self-evaluation questions are adapted from The Learning Accelerator's Digital Equity Guide Self-Assessment Tool:

1. **Are students engaging with materials that are targeted and relevant?** Can they access differentiated content from several different cultural perspectives, using a variety of modalities, such as audio and video, in an accessible way? Can they choose to access content that they find motivating and relevant and do they have strategies to support how they interact with different forms of media?
2. **Are students actively engaged with the available technology, tools, and digital materials?** Can students use various technologies, allowing them to choose the modality that best motivates them, meets their learning needs, and fits the circumstance? Is technology used not only for content acquisition, assignments, and instruction but also to connect to students' personal and professional interests?

3. **Do students have opportunities to engage in peer learning, relationship-building, and connection with the broader community?** Do students learn across multiple contexts and modalities? Are they comfortable using a variety of channels to communicate and collaborate, and possess the digital and media literacy skills and competencies to engage in socially connected learning?
4. **Can students use platforms, tools, and software that adapt to meet their needs, help them reflect and monitor progress, and support their acquisition of new knowledge and skills?** Do students experience authentic and inclusive opportunities for learning, reflection, feedback, and assessment? Do they have choice and agency in engaging with differentiated, standards-aligned materials, tracking their progress toward learning goals, reflecting on their learning, engaging in individual practice, and demonstrating proficiency or mastery? Do they possess the digital literacy skills and competencies to determine how to leverage different tools or platforms to best to meet their unique learning needs?

Montana Offers Artificial Intelligence Course for High School Students

To ensure all students in the state have an opportunity to face the future of work, the Montana Digital Academy (MTDA), a 14-year-old online school that offers more than 100 courses taught by Montana public school educators to students across the state, began offering Artificial Intelligence in the World in Fall 2023. A semester-long introductory survey of AI concepts, tools, and building blocks, the course will give high school students a broad overview of how people use AI to make decisions and solve problems. Students will study AI's ethical impacts, participate in hands-on AI-focused activities, and develop a grounding foundation for watching the technology as it evolves. The course will also focus on the history and future of AI and explore career fields, helping students understand how to embrace and use AI ethically to improve society. By making this course available to public school students across the state, the MTDA is helping ensure students in rural communities have opportunities to better understand the implications of emerging technologies and how to use them to support learning.

Some potential strategies include:

1. **Cognitive walkthroughs** are an approach to assessing usability in which one or more evaluators work through a series of tasks and ask a set of questions from the perspective of the user.[72] In education, cognitive walkthroughs systematically analyze the usability of educational materials, environments, and experiences from the learner's perspective. Cognitive walkthroughs can help educators identify obstacles students might encounter in the learning environment, including anything from accessibility challenges to a lack of culturally responsive learning materials. Considering education materials and environments from multiple learner perspectives can help ensure they work for more students.

72 (n.d.). *Usability Walkthrough*. Usability Body Of Knowledge. Retrieved September 5, 2023, from https://www.usabilitybok.org/cognitive-walkthrough

2. **Journey mapping** refers to creating a detailed visual breakdown of the smaller events that make up a larger experience.[73] This process includes depicting learners' various touchpoints, interactions, and experiences during the learning process. Journey mapping focuses on understanding the learners' perspectives, emotions, and interactions throughout their educational journey.
3. **Educator, student, and parent surveys** can provide valuable insight into the perceived benefits associated with technology implementations.

The digital use divide stands between students who have opportunities to engage actively with technology as part of their educational experiences and those who don't. All learners deserve an education designed around the active use of technology rather than the passive technology uses they report being offered most frequently in school.

In this section, we have discussed the updated definition of the digital use divide; discussed the importance of active technology use for learning; introduced UDL as a component of active technology use; explained how developing a Portrait of a Learner/Graduate can serve as a "north star" for edtech use; and discussed how to evaluate the usability, feasibility, and implementation of technology used in developing these competencies. The next section will discuss the digital design divide, focusing on educators and the larger education systems that impact their instructional effectiveness.

In the next section, we'll discuss the four Every Student Succeeds Act (ESSA) tiers of evidence and the role of research studies in the evaluation process.

73 [Consortium for Public Education]. (2021, February 24). *Design Thinking for Education, Ep. 10: Journey Mapping* [Video]. YouTube. https://www.youtube.com/watch?v=LsDxDYQnHKU

Ten Examples of Active Use in Practice

Students at Harrison Middle School in Arkansas created a video about Granny Henderson, one of the last residents of the Buffalo National River area, to learn the history of the region and make cultural connections. The Buffalo National River was the first waterway designated a national river.

Chemistry students at William C. Overfelt High School (East Side Union High School District in San Jose, California) used tech to learn how chemicals affect their lives. Students used a visible light spectrophotometer to investigate how fluorescent red-light exposure affects yeast acceleration, how fast yeast grows in cold water, and how fructose corn syrup impacts yeast growth. They worked in groups to conduct preliminary research and then measured how an independent variable of their choosing affected yeast growth.

Students at Highland Academy Charter School (6-12) in Anchorage, Alaska, conducted student-led conferences in the fall and spring at which they presented and shared electronic portfolios of all of their exemplary classwork, goals, and reflections.

Visually impaired and blind students at Breckinridge-Franklin Elementary in Louisville, Kentucky are learning to code using CodeJumper, a coding language developed by Microsoft in collaboration with American Printing House for the Blind.

The National Technical Institute for the Deaf Regional Stem Center (NRSC) has partnered with VEX Robotics and the REC Foundation to provide schools with training and resources that empower deaf students to learn STEM concepts through robotics and participate in robotics competitions.

Teachers at Del Lago Academy in Escondido, California, a high school focused on Applied Sciences, created a digital badging system for students to show evidence of their learning on the school's website. Students in the Principles of Design course created the graphics for the badges.

Verona Area School District in Wisconsin uses Virtual Field Trips for cross-curricular, cross-grade-level experience. Recently, students from different high school athletic and academic programs designed hands-on learning activities for elementary students using the NFL Play 60 Virtual Field Trip.

Second-graders at Central Dauphin School District in Harrisburg, Pennsylvania, used Minecraft to animate their water cycles into cartoons. Their teacher said that after the activity ended, the students continued to create animations in other lessons and ended up animating a story that they read in a separate lesson.

In their music class at Gorham Middle School in Gorham, Maine, students use Soundtrap to create podcasts and songs. They create compositions in music class to learn about form and genre, and use the program's text chat so their teacher can see their planning process.

Fifth-grade students at Escondido Union School District in Escondido, California, videoconferenced with rangers in four different parks along the state's coast (via the California State Parks PORTS Program) to learn how to become advocates for Marine Protected Areas. Later, the students created public service announcements to encourage people to save Marine Protected Areas.

Grapevine-Colleyville ISD students in Texas program robots to automate tasks, such as cutting the grass and cleaning the floors in schools.

the Digital Design Divide

The Digital Design Divide is between and within those systems that provide every educator the time and support they need to build their capacities to design learning experiences with digital tools, and those that do not.

While the digital use and access divides are well documented by decades of scholarship, we present the digital design divide as a new consideration of the intersection of school culture, professional learning, and edtech. The design divide is between and within those systems that provide every educator the time and support they need to build their capacity with digital tools and those that do not. While socio-economic status has historically been a predictor of where schools and school systems may fall on either side of the use and access divides, the same is not true of design. Absent vision and sustained support, effective learning design using edtech can vary between neighboring classrooms within a school, schools within a district, and districts within a state.[74] [75] [76] Considering the instructional core defined in the introduction of this report, the design divide can limit equitable, active student use, even when all students can access the necessary technologies and content. Not all teachers have the time, support, and capacities necessary to design instruction that incorporates active technology use.

Closing this divide requires a clear vision, re-imagining systems of support, and bringing teachers to the table as co-designers of their professional learning. The guidance, recommendations, and examples that follow lay out a path to supporting teachers inundated by increasing demands on their time and unclear expectations as to how they utilize technology most effectively.

In systems where the average teacher can access more than 2,000 digital tools in a given moment, training on a tool's basic functionality is insufficient. Closing the design divide moves teachers beyond the formulaic use of digital tools and allows them to actively design learning experiences for all students within a complex ecosystem of resources.

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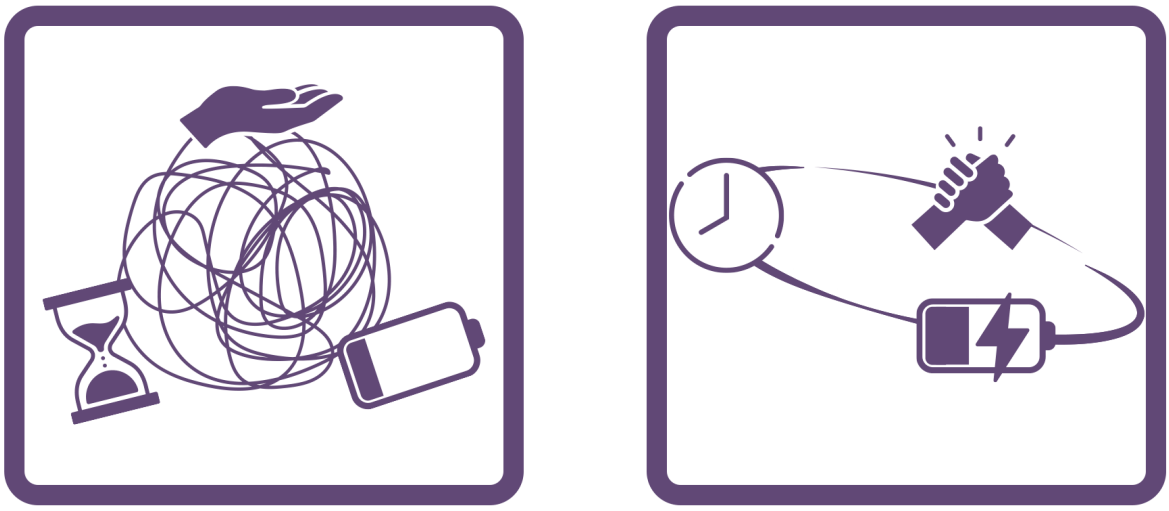
74 Senge, P. M., Hamilton, H., & Kania, J. (2015). The dawn of system leadership. Stanford Social Innovation Review. Retrieved from http://helpinghumansystems.com/wp-content/uploads/2014/01/The_Dawn_of_System_Leadership.pdf AND Dexter, S., Richardson, J. W., & Nash, J. B. (2016). Leadership for technology use, integration, and innovation. In M. D. Young & G. M. Crow (Eds.), Handbook of Research on the Education of School Leaders (2nd ed.). New York: Routledge.

75 Cuban, L. (2018). The flight of a butterfly or the path of a bullet?: Using technology to transform teaching and learning. Cambridge, MA: Harvard Education Press.

76 McLendon, M. K., Cohen-Vogel, L., & Wachen, J. (2015). Understanding education policy making and policy change in the American states. In B. S. Cooper, J. G. Cibulka, & Fusarelli (Eds.), Handbook of Education Politics and Policy (2nd ed., pp. 1–34). New York: Routledge. AND Cline, K. D. (2018). Defining the implementation problem: Organizational management versus cooperation. Journal of Public Administration Research and Theory, 10(3), 551–572. Retrieved from http://www.jstor.org/stable/3525628

Recommendations for Closing the Design Divide

1. **Develop a "Portrait of an Educator" outlining the cognitive, personal, and interpersonal competencies educators should have to design learning experiences that help students develop the skills and attributes outlined in the profile of a graduate.** (States, Districts)
2. **Design and sustain systems that support ongoing learning for new and veteran teachers and administrators, providing them with the time and space needed to design learning opportunities aligned with the Universal Design for Learning (UDL) Framework.** (States, Districts, Building-Level Administrators)
3. **Implement feedback mechanisms that empower educators to become leaders and co-designers of professional learning experiences.** (Districts, Building-Level Administrators)
4. **Provide educators and administrators with professional learning that supports the development of digital literacy skills so that they can model these skills for students and the broader school community.** (States, Districts, Building-Level Administrators)
5. **Develop processes for evaluating the potential effectiveness of digital tools before purchase, including the use of research and evidence.** (State, District, Building-Level Administrators)
6. **Foster an inclusive technology ecosystem that solicits input from diverse stakeholders to collaborate on decision-making for technology purchases, learning space design, and curriculum planning.** (States, Districts, Building-Level Administrators)
7. **Support and facilitate a systemic culture that builds trust and empowers educators to enhance and grow their professional practice to meet the needs of each student.** (States, Districts, Building-Level Administrators)
8. **Regularly solicit educator feedback and evaluate professional learning efforts to ensure alignment with the Portrait of an Educator.** (District, Building-Level Administrators)



Closing the Digital Design Divide

Modeling Student Learning Environments Building Educator Capacity

Recognizing that teacher professional learning environments and opportunities should mirror the learning environments desired for their students, education leaders at Arizona's Mesa Public Schools are committed to changing their approach to professional learning. Having identified synergies between professional learning opportunities and the practices they wanted to see in the classroom environment, the district intentionally began weaving the attitudes and skills in their portrait of a graduate into the professional learning experiences for educators.

Modeling desired classroom practices through professional learning experiences is especially important because changing teaching practices takes time. District leaders realized they needed to do things differently to create the environments they wanted in classrooms. They learned that adults who have gone through an educational system with high levels of accountability don't know they can personalize their learning experiences. They required explicit permission along the way.

Mesa provides educators with voice and choice in professional learning by developing badged specializations, allowing teachers to choose how they learn and demonstrate their learning. Developed with Teacher and School Leader Incentive Program grant funding, educators can earn badges by taking Arizona State University classes or designing their learning path to acquire and demonstrate the knowledge and skills required to earn the badge. Specializations are available in Blended and Online Learning and Deeper and Personalized Learning, with additional specializations under development.

In alignment with UDL principles, professional learning experiences are co-constructed with educators and administrators to better meet their needs. Because helping students understand who they are as learners and what does and doesn't work for them is a component of UDL, the school system takes the same approach with their adult learners. Building educator capacity to personalize learning both in the classroom and as facilitators of professional learning is a key component of Mesa's approach.

The district's belief in and commitment to their students drives their commitment to the principles of UDL in professional learning. By doing so, they are working to ensure that all students have opportunities to learn.

Begin with the End Goal in Mind: Design Portrait of an Educator

The previous section discussed the value of developing a Portrait of a Learner/Graduate to define a clear vision of cognitive, personal, and interpersonal competencies students should have when they transition between grade levels and at graduation. As Mesa Public Schools realized, for students to develop the skills and competencies outlined in their Portrait of a Learner/Graduate, they require educators who embody and exhibit these competencies. Developing a Portrait of an Educator, aligned to the Portrait of a Learner/Graduate, connects educator habits and capacities with expected student learning. Setting a clear vision for educators aligns hiring practices, professional learning opportunities, and educator evaluations with these competencies. Moreover, such educator profiles can set clear expectations for educator needs and abilities regarding edtech. From there, state and district leaders can backward design professional learning systems to ensure all educators have the time, space, and capacity necessary to develop key learning design abilities.

Aligning Educator Evaluation Systems with a Portrait of an Educator

New Hampshire's School Administrative Unit 16 (SAU-16) comprises seven smaller school districts and eight school boards around Exeter, NH. In 2020, SAU-16 brought in teachers, paraeducators, principals, and other stakeholders to begin imagining a companion Portrait of an Educator.

SAU-16 leaders recognized that without the right evaluative tools and support, the Portrait of an Educator would be just another piece of paper, so they decided to move to an asset-based evaluation system. Now, teachers develop their own growth goals—a knowledge goal focusing on pedagogy and a skill or mindset goal based on where they want to grow professionally.

Once a year, an assigned administrator observes educators, and twice per year, they can choose among peers, students, community members, and others to conduct observations. SAU-16 trained administrators in appreciative inquiry and framing their feedback through a positive lens. Teachers were asked, "How can this feedback help you grow?" and then were challenged to create their growth plan. Educators complete growth reflection sheets during the year and submit artifacts to document their progress.

Teachers indicate they appreciate the collaborative nature of the process and that observing, sharing, and having rich conversations improves their practice and sense of connectedness. They also understand the relevance of the growth process to their teaching. Teachers report that having a choice in naming their goals, choosing their collaborators, and creating their vehicles for growth is empowering and helps them tailor their professional development to their needs.

Developing a Portrait of an Educator in Rural Wyoming

Sheridan County School District 3 (SCSD3) in Clearmont, Wyoming, is a rural K-12 district with 96 students. To help the district develop a Portrait of an Educator, they hosted facilitators from the University of Wyoming (UW), who asked teachers a series of questions, including:

1. What do students need to be able to do when they graduate?
2. What do teachers need to be able to know and do to help students develop these skills in the classroom?

After collecting data, teachers were grouped to categorize responses to the questions and to paint a portrait of an educator at SCSD3. Teacher responses focused heavily on tailoring their approach to curriculum to meet individual student needs while providing them with opportunities to grow. They also emphasized the importance of creating trusting, safe, positive relationships with students, maintaining clear communication, and improving their professional skills.

SCSD3 teachers identified the following goals and abilities for their Portrait of an Educator:

- Model and cultivate learner-centered mindsets
- Design and implement learner-centered assessments
- Build learner-centered relationships and cultures
- Design and implement learner-centered instruction
- Sustain and cultivate wellness
- Collaborate, communicate, and create in a learner-centered system
- Champion learner-centered systems and communities

By actively involving teachers in the process of developing their Portrait of an Educator, SCSD3 and the UW facilitators helped ensure buy-in by giving teachers a voice.

In addition to the Portrait of an Educator, school systems may also consider creating a Portrait of an Administrator, outlining the skills and competencies needed by district-level leaders. Principals significantly impact school culture at the building level and create the conditions necessary to support the Portrait of an Educator. As Todd Whitaker has said, "When the principal sneezes, the whole school catches a cold. This is neither good nor bad; it is just the truth. Our impact is significant; our focus becomes the school's focus."[77] Just as developing a Portrait of an Educator can help support the learning environments that help students acquire the skills and dispositions of a Portrait of a Graduate, creating a Portrait of an Administrator can set the stage for a school culture that supports the success of both educators and students in using technology to support learning for all.

77 Whitaker, T. (2020). *What Great Principals Do Differently: Twenty Things that Matter Most* (3rd ed.). Routledge.

CONSIDERATIONS IN CLOSING THE DESIGN DIVIDE

Closing the design divide requires context-specific solutions. Still, some universal considerations remain the same across geographies. Once systems have set a vision by developing a profile of an educator, the following considerations can help clear the path to transformation.

Capture current culture. Understanding the current culture of an education organization is the first step to closing the design divide, whether a state education department, a school district, or an individual school. Capturing a clear understanding helps reveal the disparities between the current system state and where it wants to be. A needs assessment tool, such as the Title IV-A Needs Assessment from the Office of Safe and Supportive Schools, or asset mapping tools like those developed by Digital Promise, the Tarrant Institute for Innovative Education in Vermont, or You for Youth, may be helpful. In addition, organizations can gather climate and culture survey data using tools like the Project Tomorrow Speak Up Survey or other survey instruments.

Calculate cost. Historically, investments in building professional capacity around the use and design of lessons with edtech have paled compared to the billions of dollars invested annually on the technology itself.[78] Costs should include monetary expenses associated with hardware, software, and also professional learning and potential modifications to educator schedules. For example, suppose education leaders expect a digital tool to be used heavily across classrooms. In that case, systems should budget for the time and money necessary for educators to develop proficiency commensurate with that expectation.

Cultivate capacity. Using a tool and designing learning experiences that include using that tool are different skill sets. States, school systems, and schools working to close the design divide must cultivate educators' capacities with new tools while increasing their proficiency with key learning frameworks. Neither a template nor a curriculum, UDL provides a common research-based structure and language to help all teachers design learning experiences to impact all learners.

Curate effective products. With vision, funding, and support in place, systems closing the design divide include structures for collaborative review of impact, barriers, and measured effectiveness. Effective systems intentionally build time and support for educators to share, analyze, and improve their professional practices.[79] [80] [81] [82] [83] These systems deepen educator capacity to design learning experiences using multiple technological tools.

Build evidence. With finite time and funding, it is incumbent upon education systems to verify the effectiveness of technological tools before purchase and adoption, and during classroom implementation. Inquiring about digital resources' evidence base can serve as a first line of defense for worthwhile use of educator and student time. See page 49 for a description of the ESSA evidence tiers.

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78 (2021, March 1). OVERVIEW: U.S. K-12 Public Education Technology Spending. Edtech Evidence Exchange. Retrieved October 25, 2023, from https://edtechevidence.org/wp-content/uploads/2021/07/FINAL-K12-EdTech-Funding-Analysis_v.1.pdf

79 Darling-Hammond, L., Hyler, M. E., Gardner, M. (2017). Effective Teacher Professional Development. Palo Alto, CA: Learning Policy Institute.

80 Killion, J. (2023). Establishing time for professional learning (2nd ed.). Learning Forward.

81 Mourshed, M., Chijioke, C., & Barber, M. (2010). How the world's most improved school systems keep getting better. McKinsey & Company. Retrieved from McKinsey: https://www.mckinsey.com/industries/education/our-insights/how-the-worlds-most-improved-school-systems-keep-getting-better

82 Walton, N. (2017). Worldwide educating for the future index. (M. Gold, Ed.) The Economist Intelligence Unit (pp. 1–40). Retrieved from The Economist website: http://educatingforthefuture.economist.com

83 World Economic Forum. (2015). New vision for education. Retrieved from The World Economic Forum web site: http://www3.weforum.org/docs/WEFUSA_NewVisionforEducation_Report2015.pdf

Deeper Dive: Capture Current Culture

School culture impacts edtech use and student achievement. Research that reviewed two decades of evidence (including six quantitative, longitudinal studies involving 22,000 principals) found that principals have significant positive effects on student learning and that effective principals orient their practice toward instructionally focused interactions with teachers, building a productive school climate, facilitating collaboration and professional learning communities, and strategic personnel and resource management processes.[84]

Analysis of nearly a decade of data from schools in an urban North Carolina district, one of the largest in the country, showed that teachers achieved more significant increases in their student's standardized test scores in schools with supportive professional environments—especially those with more peer collaboration and positive school culture—than did teachers in schools with less supportive professional environments.[85]

Other research analyzing two years of data on more than 9,000 teachers in 336 Miami-Dade County public schools showed that schools with better-quality collaboration—meaning teachers reported that their cooperation in instructional teams was both "extensive" and "helpful"—had higher student achievement gains in math and reading. These results held, even controlling for other characteristics of those schools' students and teachers, meaning the researchers could be more confident that the difference was related to the quality of collaboration at the school and not to differences in the students and teachers themselves.[86]

Reconsidering Educator Learning Time to Improve Student Learning Time

When Brigantine Public Schools in New Jersey considered how they might improve the active use of technology for all students, they realized they needed to attend to educator needs first. They needed to reconsider teacher schedules to provide them with what was needed to design digital learning experiences that meet the needs of all students. They also realized this meant overcoming logistical and cultural challenges, including scheduling, budgeting, mindsets, and tradition. After a thoughtful design process that included school and district administrators, educators, and instructional coaches, the district arrived at a solution. They developed a new schedule that includes an additional planning period for common teacher planning time, articulation meetings, and sharing/teaching new approaches to technology use for staff and students. The new systemic approach closes the design divide in ways that translate to greater active use for all students.

Changing school culture begins with senior leadership. First, it requires first understanding what educators need to help all students reach the goals in the Profile of a Learner/Graduate and creating policies and systems that help educators do so. Leaders must model the dispositions and practices they wish to see in classrooms, including using technology to support teacher voice and choice.

84 Grissom, J.A., Egalite, A.J., Lindsay, C.A. (2021, February). How principals affect students and schools: A systematic synthesis of two decades of research. The Wallace Foundation. www.wallacefoundation.org/principalsynthesis

85 Ibid.

86 Ronfelt, M., Farmer, S. O., McQueen, K., & Grissom, J. A. (2015). Teacher Collaboration in Instructional Teams and Student Achievement. *American Educational Research Journal*, 52(3), 475–514. https://doi.org/10.3102/0002831215585562

To aid in understanding current strengths and needs, systems can use tools such as:

- Needs assessments such as the Title IV-A Needs Assessment from the Office of Safe and Supportive Schools.
- Asset mapping tools like those developed by Digital Promise, the Tarrant Institute for Innovative Education in Vermont, or You for Youth, may be helpful.
- Or surveys like the Project Tomorrow Speak Up Survey.

Shifting expectations of classroom technology use begins with changing how adults in the system are using technology. Understanding strengths and needs can be an important first step in this shift. These processes can also help to uncover biases in practice such as those documented in Matthew Rafalow's Digital Divisions.[87] Once uncovered, schools and districts can begin the work of ensuring high expectations of use for all students that includes mindfulness of unintended bias.

Deeper Dive: Calculate Costs

As discussed above, the costs of foundational changes in teaching practices go beyond the monetary expenses traditionally associated with technology initiatives: hardware, software, and professional learning. Providing educators with the time and support to become learning designers requires education leaders to reconsider time and monetary budgets for professional learning as well.

Cost Calculation Resources

The following resources developed by or in partnership with the U.S. Department of Education's Institute of Education Sciences (IES) may be helpful for calculating costs:

- The IES Cost Analysis Starter Kit, version 1.0
- Cost Analysis in Practice (CAP) Project
- American Institutes of Research›s Standards for the Economic Evaluation of Education and Social Programs
- E$timator tool
- The Critical Importance of Costs for Education Decisions

Teachers in the United States spend far more time engaged in active instruction than in other high-performing countries. Based on self-reported data, teachers in the United States spend 27 hours teaching out of 45 hours of work per week. Compare this with teachers in Singapore, who teach only 17 hours per week, or teachers in Finland, who teach 21 hours per week. Schools in these countries prioritize time for planning and collaboration, recognizing that developing and executing lessons takes time and preparation.[88]

Because school system resources are often tightly constrained, it can be difficult for education leaders to think creatively about scheduling. However, school systems are effectively reimagining the school day within existing budget constraints. Even small changes to existing schedules can help make a difference. Leaders considering how they might reconsider time budgets within school days can find examples from the Center for American Progress's Reimagining the School Day and the Wallace Foundation's Reimagining the School Day: More Time for Learning.

87 Rafalow, M. H. (2021). Digital divisions: How schools create inequality in the tech era. University of Chicago Press.
88 https://www.americanprogress.org/article/reimagining-the-school-day/

State Program Facilitates the Sharing of Instructional Technology Coaches Among Districts

The Learning Technology Center (LTC), a program of the Illinois State Board of Education, provides edtech services, support, and professional learning for K-12 Illinois schools, educators, and technology leaders. Recognizing that many small and medium-sized school systems could not afford a full-time instructional technology coach, the LTC developed the LTC Instructional Technology Coach Program. The program leverages an innovative cost-sharing model, allowing multiple districts in a similar geographic area of the state to "share" the costs of an instructional technology coach for a predetermined number of days throughout the school year. This program allows them to access the benefits of coaching without adding staff or committing to a full-time employee.

In the spring of each year, the LTC works with districts to identify their instructional coaching needs, determine the number of days they would like support from a coach (from 10-170 days), and pairs up neighboring districts. Together, the LTC and the districts interview and select a coach with pedagogical and technological experience. Even though the coach is an LTC employee, it is essential that the districts feel the coach is a fit for their culture. Districts then complete an onboarding document that helps situate the coach regarding the district's goals, daily procedures, and technology. Doing so allows the coach to enter classrooms on day one to build relationships and support educators.

The instructional technology coaches support teachers through coaching cycles. Teachers identify an area of need, and coaches work 1:1 with teachers to set goals, create an action plan, and support them through that action plan. The coaching cycle includes time for reflection, where coaches sit down with teachers, identify the impact that they have had on student learning, and plan how to carry that through in future lessons.

In 2022-2023, the LTC had eight coaches working across 75 school buildings in Illinois. In those buildings, more than 2,000 teachers are impacting more than 26,000 students. The instructional technology coaching program helps even the smallest school systems make the most of their technology investments while providing their teachers with personalized, job-embedded professional development.

Leveraging Online Learning to Support Teacher Competency Development

Like many districts, Cajon Valley Union School District in California has faced challenges providing differentiated professional learning for teachers and staff. With limited opportunities for in-person learning, exacerbated by the increasing difficulty of finding substitutes, they decided to leverage online learning to support district employees. Built on the Alludo platform, they developed Cajon 365, a professional learning platform providing educators with anytime, anywhere access.

Through Cajon 365, which includes customized learning content, employees can demonstrate competencies and earn digital badges, points, and rewards. Educators can choose the areas to focus on to meet their classroom, personal, and professional goals. With Cajon 365, district leadership can add new content any time based on current objectives and goals. The platform is also used for onboarding new employees, ensuring they don't miss out on important content.

Cajon 365 provides visibility on learning progress across schools and the district and is used as a metric in the Cajon Valley Local Control and Accountability Plan. In two years, Cajon 365 supported 1548 learners with more than 10,000 hours of professional learning.

Where monetary investment is needed, several federal funding sources can support educator professional learning. The 2023 Dear Colleague Letter: Leveraging Federal Funds for Teaching and Learning With Technology from the U.S. Department of Education provides some examples of how funds under Titles I through IV of the Elementary and Secondary Education Act of 1965, as amended (ESEA) and the Individuals with Disabilities Education Act (IDEA) may support the use of technology to improve instruction and student outcomes. Importantly, informal supports for students with disabilities are not a substitute or replacement for IDEA compliance and reasonable accommodations.

- Title II, Part A authorizes programs to improve the quality and effectiveness of teachers and school leaders through professional development and other allowable activities at the state and district levels. Allowable uses of Title II, Part A funds focuses on job-embedded, evidence-based, and classroom-oriented activities. Title II, Part A funds may be used to provide professional development funds to teachers and school leaders, and in some circumstances paraprofessionals such as teaching assistants, instructional support personnel, interventionists, and other staff.
- Title I, Part A provides funds that may be used, in a school implementing a Title I schoolwide program, for professional development for teachers and specialized instructional support personnel if that use is supported by the school's comprehensive needs assessment and schoolwide plan.
- Title I, Part C provides for professional development programs, including mentoring, for teachers and other program personnel, specifically in support of migratory children.
- Title I, Part D provides appropriate training for teachers and other instructional and administrative personnel to meet the educational needs of neglected, delinquent, and at-risk children and youth.

- Title III provides funds that may be used to supplement professional development designed to increase the English language proficiency of ELs and immigrant students, for example by supplementing professional development around providing language instruction educational programs and helping ELs meet academic content standards.
- Title IV, Part A provides funds that may be used for professional development for the effective use of data and technology, academic assessments, career and technical education, and family and community engagement.
- Title IV, Part B (Nita M. Lowey 21st Century Community Learning Centers (21st CCLCs)) supports the creation of community learning centers that provide academic enrichment opportunities during non-school hours for children. 21st CCLCs may use some funds to provide professional development for their staff. States may also reserve some of their 21st CCLC funds to provide training to applicants and recipients of these funds.
- Title V, Part B provides supplemental funds for rural LEAs that are either small or serve high numbers of low-income students. The funds may generally be used for supplemental activities that are allowable under Title I-A, Title II-A, Title III, and Title IV-A and -B.
- Title VII, Impact Aid is a highly flexible funding stream for eligible school districts serving federally connected children. Districts may use Impact Aid funds at their discretion, including professional learning.
- The McKinney-Vento Homeless Act provides funding for professional learning to facilitate and enhance the identification, enrollment, attendance, and success in school of homeless children and youth.
- Career and Technical Education (Carl D. Perkins Act) provides funds to Eligible Recipients (generally, LEAs, area CTE schools, or postsecondary non-baccalaureate granting institutions) for the purposes of career and technical education. Professional development programs related to career and technical education for teachers, counselors, and administrators is an allowable use of funds.
- The Individuals with Disabilities Education Act (IDEA) provides for professional learning and collaborative planning related directly to the provision of special education. For example, LEAs may use up to 15 percent of their IDEA Part B funds to develop and implement coordinated early intervening services for students who are not currently identified as needing special education or related services, but who need additional academic and behavioral support to succeed in a general education environment, which can include relevant professional development for teachers and other school staff.

In addition to federal funds, school system leaders should consult their state education departments regarding state-specific funding for educator professional learning. Private foundations and other non-governmental organizations also provide grant funds to support educator professional learning.

Considering UDL in Procurement

It can be helpful to evaluate edtech tools against the UDL framework as part of the procurement process. Some practical steps states and school systems can take include:

1. **Becoming familiar with the three UDL principles and their guidelines.** Understanding how each principle aims to address the needs of diverse learners.
2. **Reviewing the evaluation framework for the CAST UDL Product Certification**. Although geared towards edtech products seeking UDL product certification, it is a helpful resource for states and school systems evaluating edtech tools, even if they are not certified.
3. **Exploring the features and functionalities of the edtech tool**. Does it prioritize student access and engagement? Does it consider learners' interests and motivations? Does it ensure learners have multiple ways to gain comprehension, and does it provide multiple ways to share their knowledge and ideas? Is the tool user-friendly and easy to navigate?
4. **Ensuring the tool includes accessibility features like text-to-speech, closed captioning, and keyboard navigation**. The Quick Reference Guide for Web Content Accessibility Guidelines (WCAG) can be helpful.
5. **Considering if assessments within the tool accommodate diverse ways of demonstrating knowledge and understanding.**

Deeper Dive: Cultivate Capacity

High-quality professional learning opportunities can positively impact student achievement, especially when educators have the time to collaborate and design impactful learning experiences.[89] [90] However, not all professional learning opportunities are of equal caliber. Fortunately, research has identified the characteristics of effective professional learning structures.

The definition of *professional development*[91] included in the *Every Student Succeeds Act* includes the critical characteristics that should be present in any high-quality professional learning opportunity: sustained (not stand-alone, one-day, or short-term workshops), intensive, collaborative, job-embedded, data-driven, and classroom-focused.[92] A Learning Policy Institute review of 35 methodologically rigorous studies demonstrated a positive link between teacher professional development, teaching practices, and student outcomes. This study identified critical features of effective models, finding that high-quality professional learning:

89 Learning Forward. (2019). The path to instructional excellence and equitable outcomes. Oxford, OH: Author.
90 Garrett, R., Zhang, Q., Citkowicz, M., & Burr, L. (2021). How Learning Forward's Professional Learning Standards are associated with teacher instruction and student achievement: A meta-analysis. Washington, DC: Center on Great Teachers and Leaders at the American Institutes for Research.
91 Learning Forward (n.d.). *Definition of Professional Development*. Powered By Title II. Retrieved September 6, 2023, from https://poweredbytitleii.com/resources/definition-of-professional-development/
92 Page 296, ESSA, Section 8002.

- **Is content focused:** focuses on teaching strategies associated with specific curriculum content that supports teacher learning within teachers' classroom contexts. This element includes an intentional focus on discipline-specific curriculum development and pedagogies in areas such as mathematics, science, and literacy.
- **Incorporates active learning:** Active learning engages teachers directly in designing and trying out teaching strategies, providing them an opportunity to engage in the same style of learning they are designing for their students, using authentic artifacts, interactive activities, and other strategies to provide deeply embedded, highly contextualized professional learning. This approach moves away from traditional learning models and lecture-based environments that have no direct connection to teachers' classrooms and students.
- **Supports collaboration:** High-quality professional learning creates space for teachers to share ideas and collaborate in their learning, often in job-embedded contexts. By working collaboratively, teachers can create communities that positively change the culture and instruction of their entire grade level, department, school, or district.
- **Uses models of effective practice:** Curricular and instruction modeling provide teachers with a clear vision of what best practices look like. Teachers may view models that include lesson plans, unit plans, sample student work, observations of peer teachers, and video or written cases of teaching.
- **Provides coaching and expert support:** Coaching and expert support involve sharing content and evidence-based expertise focused directly on individual teachers' needs.
- **Offers feedback and reflection:** High-quality professional learning frequently provides built-in time for teachers to think about, receive input on, and make changes to their practice by facilitating reflection and soliciting feedback. Feedback and reflection help teachers thoughtfully move toward the expert visions of practice.
- **Is of sustained duration:** Effective professional learning provides teachers with adequate time to learn, practice, implement, and reflect upon new strategies that facilitate changes in their practice.[93]

Several organizations have developed standards for educators and administrators and/or professional learning, which school system leaders may find helpful. The Learning Forward Standards for Professional Learning, the ISTE Standards, and the National Board for Professional Teaching Standards, along with the UDL Guidelines, can help guide the development of high-quality professional learning experiences for educators and administrators.

93 Darling-Hammond, L., Hyler, M. E., Gardner, M. (2017). Effective Teacher Professional Development. Palo Alto, CA: Learning Policy Institute.

Designing Wrap-Around Teacher Support as a New Normal

When Denver Public Schools (DPS) in Colorado considered the patterns of teacher engagement in professional learning opportunities across the district, they noticed a familiar problem. Teachers attended one-off trainings on thoughtfully integrating technology within their practice and then moved on. The district team, including the Senior Manager of EdTech and Library Services, EdTech Manager, and Digital Coaches, knew that research has shown such one-off efforts have limited impact on meaningful change in practice. District leaders wanted to find a way to incorporate full professional coaching cycles into existing professional development sessions.

DPS shifted expectations. Teachers signing up for one-off sessions were also required to participate in professional coaching cycles related to the topics of each session.

The shift resulted in initial attrition in registration numbers and required team attention to navigate the logistics of such a change in practice. The edtech team worked with the DPS professional learning department and the local union to resolve these logistical considerations. The team reports a shift in the effectiveness of their professional learning offerings, noting teachers are more likely to stay in touch or reach out when they have questions due to the coaching. Evidence is more than anecdotal. The team has seen an increase in teacher registration year over year. Additionally, they have seen increased completion rates from registration to end-of-year completion as educators settle into this new normal of ongoing support.

UDL School Implementation and Certification Criteria

The UDL School Implementation and Certification Criteria provides school teams with a blueprint for designing and improving school wide UDL implementation. Four domains are central to building a school's UDL ecosystem: School Culture and Environment; Teaching and Learning; Leadership and Management; and Professional Learning. Each domain has four elements describing the essential characteristics of a school implementing UDL. The criteria were developed using insights from implementation, improvement, and learning science research and informed by ongoing input and feedback from experienced UDL leaders throughout the field of education. While the full certification process is not yet available, the UDL-SICC criteria and related tools—including a school self-assessment—support school system UDL implementation efforts.

The Learner Variability Navigator

Learner variability recognizes that each student has a unique constellation of interconnected strengths and challenges. The Learner Variability Navigator (LVN) is a free and open-source web-based tool designed to make the science of learning more accessible. By highlighting connections among factors critical to student success and instructional strategies, the LVN helps educators understand why certain strategies may impact students differently, thus empowering them to support the full diversity of learners. The LVN includes six learner models from grades pre-K through 12 in literacy and math, and an adult learner model—all based on a whole learner framework curated by researchers and practitioners.

Building Educator Capacity for Data Visualization and Use Across Nebraska

In Spring 2023, the Nebraska Department of Education (NDE) kicked off its third cohort within its Data Visualization and Use Education Innovation Network. Educators selected to join the network participate in webinars to increase their capacity to design data visualizations to communicate student learning and engage in continuous improvement. The webinars give teachers experience with topics including:

- Why Use Data?
- Data Analysis Basics & Common Tools
- Data Visualization: Charts, Maps that Make Sense
- Storytelling with Data, Diving Deeper into Data
- Diving Deeper into Data
- Data for Improving Outcomes: Turn Data into Action

Sponsored by the NDE Data Management and Navigation Team, data visualization is one of a handful of networks created by NDE to support its "Commitment to Equity of 'ensuring equity of access by supporting quality instructional materials.'"[94] The cohort model ensures a standard level of competency for participating educators and connects participants from across Nebraska's 19 educational services units and 247 school districts. Members meet monthly for discussion and knowledge sharing.

94 https://www.education.ne.gov/pmo/the-innovation-grant/education-innovation-networks-ein/#dvu

Procurement Best Practices

Rather than relying on retrofitting for accessibility as the need arises, the district team at Francis Howell School District in O'Fallon, Missouri, built accessibility into technology planning and procurement.[95] The district also realized they would not find one device that fit the accessibility needs of all students. When special education case managers need a specific device to meet student needs, they know the district technology department has a variety of devices on hand to meet those varying needs. The district has also realized that what is necessary for some can benefit all. Originally, students needing text-to-speech features activated on their devices had to request that the district activate the services. Now, the feature is under the students' control. Finally, Francis Howell is working to systematize accessibility as a component of technology procurement. When considering new technology purchases, the district team includes the district assistive technology and Americans with Disabilities Act compliance coordinator to ensure that future technology won't mean students waiting to activate or install the needed features.

95 CAST (n.d.). *Procurement as a Collaborative Process*. National Center on Accessible Educational Materials. Retrieved September 6, 2023, from https://aem.cast.org/get-started/resources/accessible-learning-experience/s02-ep04-procurement-collaborative-process

Deeper Dive: Curate Effective Products

While having a vision or north star for using technology in instruction is critical, carefully considering a given edtech product's prior evidence of effectiveness before purchase and then evaluating the extent to which it is achieving important student learning and other objectives during and post-implementation is equally important. In the digital use divide section, we discussed how education leaders can evaluate tools associated with the more open-ended practices of active technology use. The classroom success of these kinds of tools is likely influenced by how they are deployed and utilized, as well as the features of the tools themselves. In this section, we'll discuss the role of research in edtech evaluation, which often aligns with more closed-ended, subject-specific digital tools such as digital textbooks and curricula, math and language learning apps, or adaptive learning/assessment platforms.[96]

Despite the significant financial investments made in education technologies, school districts often make purchasing decisions without considering available evidence regarding the effectiveness of technologies. According to a 2023 LearnPlatform report, only 26 of the 100 most accessed edtech products in K-12 classrooms during the first half of the 2022-23 school year had published research aligned to one of the four tiers of evidence in ESSA. Research has found that nine in 10 educators admit they rely on general web searches to gather information about edtech,[97] while 59 percent base their procurement decisions on recommendations from peers.[98] A 2017 survey found that 90 percent of teachers and education leaders said they didn't insist on research being in place before adopting or buying a product. [99] Even when research is available, it may not take into account contextual differences across districts.[100]

The Elementary and Secondary Education Act (ESEA)[101] encourages state and local educational agencies to prioritize evidence-based practice, which can include the use of edtech in schools.[102] The U.S Department of Education has defined "evidence-based" and other terms for use in ESEA programs and other programs in its regulations (see 34 CFR 77.1). Under ESEA, there are four tiers of evidence, with the first tier providing the strongest form of evidence: (1) Strong Evidence, (2) Moderate Evidence, (3) Promising Evidence, and (4) Demonstrates a Rationale.[103] Refer to the graphic below for definitions of the four tiers of evidence.

96 The Edtech Genome Project Report. The Edtech Evidence Exchange. Retrieved October 24, 2023, from https://edtechevidence.org/AboutUs/TheGenomeProject/

97 Krueger, N. (2019, December 25). *The Five Pillars of Edtech Procurement*. ISTE. Retrieved August 16, 2023, from https://www.iste.org/explore/empowered-learner/five-pillars-edtech-procurement

98 Morrison, J. R., Ph.D., Ross, S. M., Ph.D. DD, Corcoran, R. P., Ph.D., & Reid, A., Ph.D. (2014, September 22). *Fostering Market Efficiency in K-12 Ed-tech Procurement*. Digital Promise. Retrieved August 16, 2023, from https://digitalpromise.org/wp-content/uploads/2016/02/DP_ImprovingEdTechPurchasing_FullReport.pdf

99 Abamu, J. (2017, July 17). *How Much Do Educators Care About Edtech Efficacy? Less Than You Might Think*. Edsurge. Retrieved August 16, 2023, from https://www.edsurge.com/news/2017-07-17-how-much-do-educators-care-about-edtech-efficacy-less-than-you-might-think

100 https://www.iste.org/explore/empowered-learner/five-pillars-edtech-procurement

101 United States. (1965). Elementary and secondary education act of 1965: H. R. 2362, 89th Cong., 1st sess., Public law 89-10. Reports, bills, debate and act. [Washington]: [U.S. Govt. Print. Off.],

102 U.S. Department of Education, Office of Educational Technology, Using Evidence to Support EdTech Adoption in Schools, Washington, D.C., 2023. Retrieved November 3, 2023, from https://tech.ed.gov/evidence/

103 United States. (1965). Elementary and secondary education act of 1965: H. R. 2362, 89th Cong., 1st sess., Public law 89-10. Reports, bills, debate and act. [Washington]: [U.S. Govt. Print. Off.],

UNDERSTANDING THE ESSA TIERS OF EVIDENCE

	TIER 1 Strong Evidence	TIER 2 Moderate Evidence	TIER 3 Promising Evidence	TIER 4 Demonstrates a Rationale
Study Design	Well-designed and implemented experimental study, meets WWC standards without reservations	Well-designed and implemented quasi-experimental study, meets WWC standards with reservations	Well-designed and implemented correlational study, statistically controls for selection bias[a]	Well-defined logic model based on rigorous research
Results of the Study	Statistically significant positive effect on a relevant outcome	Statistically significant positive effect on a relevant outcome	Statistically significant positive effect on a relevant outcome	An effort to study the effects of the intervention is planned or currently under way
Findings From Related Studies	No strong negative findings from experimental or quasi-experimental studies	No strong negative findings from experimental or quasi-experimental studies	No strong negative findings from experimental or quasi-experimental studies	N/A
Sample Size & Setting	At least 350 participants, conducted in more than one district or school	At least 350 participants, conducted in more than one district or school	N/A	N/A
Match	Similar population *and* setting to your setting	Similar population *or* setting to your setting	N/A	N/A

a. Findings from experimental and quasi-experimental studies that either (a) meet the first three criteria for Tiers 1 and 2 but not the sample size, setting, or match requirements, or (b) do not meet WWC standards but statistically control for selection bias between the treatment and comparison groups are also eligible to meet Tier 3 Promising Evidence.

Deeper Dive: Build Evidence

High-quality evidence about a given edtech product's effectiveness isn't always available to support adoption decisions—and educators don't always receive the training and support they need to build evidence of a product's effectiveness on their own.[104] As a result, there is a substantial need for accessible professional learning resources specifically designed to support schools in evidence-building activities. To help close this gap, the U.S. Department of Education developed the EdTech Evidence Toolkit, which includes four Evidence One-Pagers and a Blog Series. The toolkit offers educational leaders support in using evidence to inform edtech adoption decisions in schools by providing:

- Introductory evidence-building activities for four tiers of evidence, as outlined in ESEA
- Example case studies for using evidence-building activities to inform edtech adoption
- Suggestions for collaborative activities to encourage the use of evidence in schools

104 U.S. Department of Education (2023, April 11). Every Student Succeeds Act. Office of Educational Technology Blog. Retrieved August 16, 2023, from https://medium.com/@OfficeofEdTech/ng-using-professional-development-to-support-edtech-evidence-building-in-schools-c5d6ddf6cf52

The purpose of the EdTech Evidence Toolkit is threefold:

1. To offer an introductory resource for understanding the four tiers of evidence, as outlined by ESEA, concerning edtech adoption,
2. To present a practical school district case study across the four tiers of evidence that uses evidence-building activities incrementally to inform edtech adoption, and
3. To serve as a resource to inform professional development efforts supporting use of evidence in schools.

State education departments can and should help empower districts and schools to expand current uses of evidence (for example, diagnostic data to inform individual student intervention) by providing professional learning and guidance to build district-level capacity. When educational leaders help school systems adopt the scientific method to inform decision-making, school systems can engage in evidence-building activities that support positive student outcomes. Including schools as participants in evidence-building supports self-advocacy and lessens the gap between research and practice.[105]

Additional resources available to help education stakeholders successfully choose and implement evidence-based project components designed to improve learner outcomes include the following:

1. U.S. Department of Education's Non-Regulatory Guidance: Using Evidence to Strengthen Education Investments. This guidance: (1) reviews steps for effective decision-making about evidence use and evidence building; (2) describes in detail the four evidence levels introduced in Section 8101(21)(A) of the ESEA and how they are used by the Department in its discretionary grant programs through EDGAR (34 CFR 77.1); and (3) clarifies how a variety of evidence can be used to inform decision making.
2. The What Works Clearinghouse provides practice guides and intervention reports which provide evidence-based recommendations for educators and research findings for education interventions and practices.
3. The Regional Educational Laboratory Program (REL) consists of 10 regional laboratories which collaborate with school districts, state departments of education, and other education stakeholders to help generate and apply evidence with the goal of improving learner outcomes.

105 U.S. Department of Education (2023, April 11). *Every Student Succeeds Act*. Office of Educational Technology Blog. Retrieved August 16, 2023, from https://medium.com/@OfficeofEdTech/ng-using-professional-development-to-support-edtech-evidence-building-in-schools-c5d6ddf6cf52

Massachusetts State Resources Help Ensure Equitable and Effective Edtech Use

The Massachusetts Department of Elementary & Secondary Education's Office of Educational Technology (OET) promotes the strategic and equitable usage of edtech in the state. The OET recognized that despite significant progress in access to devices and the internet for students, that access was not necessarily translating into equitable learning experiences.

Toward that end, the office published an EdTech Strategic Planning Guide identifying the foundational conditions for a healthy school technology system. The office then partnered with The Learning Accelerator to produce the more technical Edtech Systems Guide: Equity-Driven Selection, Implementation, and Evaluation to help school system leaders strengthen their edtech processes. The impetus for the Edtech Systems Guide came from edtech leaders asking for support as they struggled to evaluate the effectiveness and impact of tools purchased during the pandemic. Department leaders also saw the opportunity to reinforce the idea that how edtech tools are selected and implemented is integral to their ultimate impact. The EdTech Systems Guide helps edtech leaders work through that process while keeping equity at the forefront. District technology leaders were essential to the development of the guide, ensuring it would be relevant and practical for practitioners. A companion workbook accompanies the guide so district teams can work collaboratively on the recommended action steps. The guide also includes considerations for students who are English language learners; students with individualized education programs; and large and small school systems.

The state has supported leaders to implement its recommendations to bolster the guide's impact. In continued partnership with The Learning Accelerator, OET launched an EdTech Peer Learning Cohort for district teams composed of edtech, instructional leaders, educators, and, sometimes, students. Cohort participants developed a problem of practice related to improving edtech systems, received individualized coaching, and collaborated with other participants in virtual sessions. Examples of issues that cohort teams worked on include incorporating student voice into edtech evaluation and how to increase student information system usage by families of English language learners. These case stories capture the cohort experiences.

Mendon-Upton Includes Student, Teacher Voice in Edtech Procurement

Mendon-Upton Regional School District (MURSD) is a small suburban district in central Massachusetts which provides their teachers access to more than 200 edtech tools. MURSD participated in the Massachusetts Department of Elementary & Secondary Education's OET 2022-2023 EdTech Peer Learning Cohort. During this cohort, MURSD improved edtech evaluations to align with the district's vision and curricular needs.

MURSD incorporated student voice in the edtech evaluation process by appointing a high school student to the technology committee, which determined the criteria for evaluating each edtech tool in the district. The committee also included a teacher, a media center specialist, a technician, and the technology director, who led the committee. They included the student in every conversation and the student and even built a technology inventory database for the district.

The committee also developed a process for teachers interested in piloting edtech tools. Teachers can nominate tools they want to test using the Digital Tool Pilot Proposal Form. The technology team reviews the submitted proposals and scores them on the MURSD Digital Tool Pilot Evaluation Rubric to help ensure the pilot's success. Finally, pilot teachers participate in an annual Digital Tool Evaluation process each school year in May. Educators and students self-report their experience with the tool using the district's evaluation form. The form differentiates questions by role and asks users about impact, usability, engagement, and whether they would recommend the tool. Based on this input, the technology team can renew the pilot and potentially scale the tool, abandon the tool, or consider redesigning the pilot.

By including teacher voices in the selection process, the MURSD technology team hopes to identify the tools supporting student learning and thoughtfully invest in effective solutions.

While the closing of the digital use divide calls on systems to envision and enact equitable active use for all students as a part of the instructional core, the digital design divide calls on schools and districts to leverage resources necessary for all teachers within the core to execute this vision.

Unlike the use and access divides, the design divide cannot be predicted by student socio-economic status because it can exist between teachers in neighboring classrooms teaching students with the same demographics and access to the same technologies. Closing the divide and bringing equity of capacity to these and all other teachers will include mechanisms like professional learning communities, coaching cycles, and feedback systems that provide teachers with the evidence they need to make informed design decisions. It will require insistence on research-supported tools, re-considering schedules, and providing educators with a framework to design effective student learning experiences for all.

For schools to realize the potential of edtech to help transform learning for all students, they must be willing to imagine how they can transform learning for all educators.

Study Indicates Technology Can Support Reduced Juvenile Justice Recidivism

When researchers from Arizona State University and the Oregon Research Institute set out to determine how to reduce recidivism in juvenile justice offenders, they began with two questions: 1. Were youth receiving technology-enabled support services less likely to recidivate than peers who weren't receiving these services? 2. Were any specific components of these supports significantly associated with recidivism reduction? Youth in the treatment group received services such as:

- Technology-enhanced education and cognitive restructuring
- Individualized and intensive educational and vocational programming
- Access to a transition specialist from prerelease to at least 30 days post release
- Intentionally integrated technology practices

Results of the non-randomized comparison study[106] published in 2023 showed "the comparison group had a significant 201 percent greater odds to recidivate two years post-release from the facility." While technology played an integral part in supporting the youth in the treatment group, the study offers a powerful example of the importance of considering each component of the instructional core. Transition specialists served as teachers, technology delivered individualized content, and the youth were called on to be actively involved in their own education. Such studies show the power of what is possible when the design divide narrows in support of all learners.

106 Mathur, S. R., Griller Clark, H., & Gau, J. M. (2023). Technology integration: a promising way to mitigate recidivism of youth in juvenile justice. Preventing School Failure: Alternative Education for Children and Youth, 1-8.

the Digital Access Divide

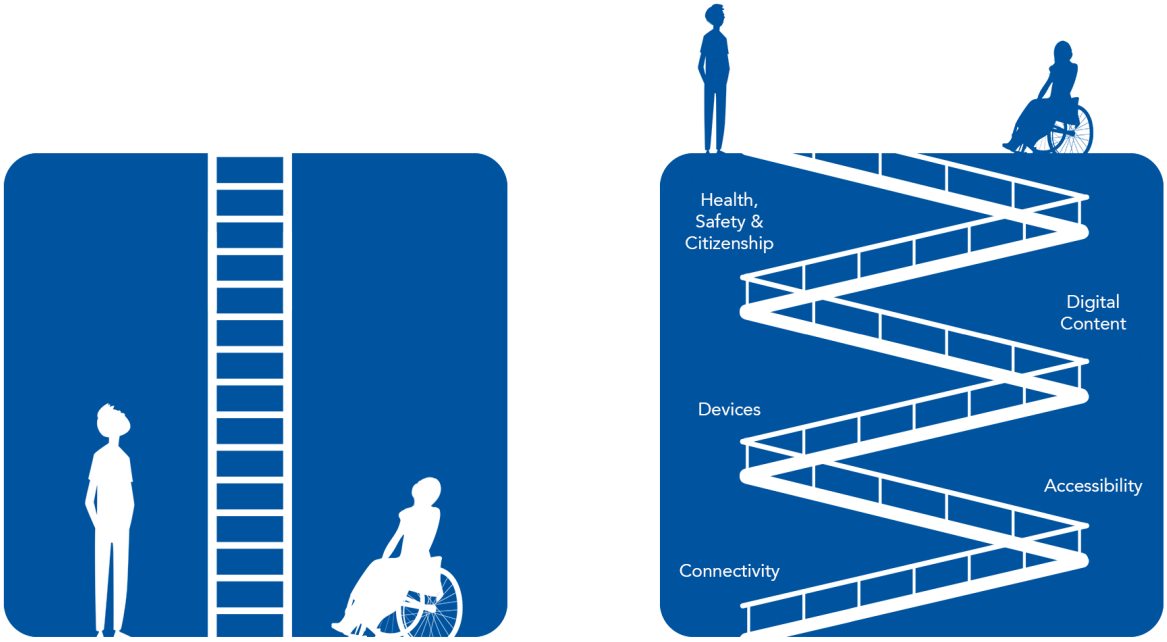
The Digital Access Divide stands between those students and educators who have equitable, sustainable access to connectivity, devices, and digital content and those who do not. This also includes accessibility and digital health, safety, and citizenship.

For all learners to have the deep, complex, active learning experiences described above, states and districts must focus on closing one other key divide - the digital access divide. This divide has historically been defined as providing equitable access to reliable, high-speed connectivity, hardware, and digital resources. Accessibility and digital health, safety, and citizenship are also key to closing the access divide. While school systems have made great strides in closing the digital access divide since the publication of the 2017 NETP, pernicious problems such as geographic barriers and local skill capacity require swift action at all levels to realize the design and use visions laid out above. This section outlines the recommendations and examples of learning environments designed (or re-designed) to close that divide and enable "everywhere all-the-time learning."

Recommendations for Closing the Access Divide

1. **Develop a "Portrait of a Learning Environment" to set expectations around habits and abilities no matter what the space.** (States, District)
2. **Establish and maintain a cabinet-level edtech director to ensure the wise and effective spending of edtech funds.** (States, Districts)
3. **Conduct regular needs assessments to ensure technology properly supports learning.** (States, Districts, Building-Level Administrators)
4. **Develop model processes and guidelines for device refresh policies based on local funding structures.** (States, Districts)
5. **Leverage state purchasing power or regional buying consortia when purchasing edtech hardware, software, and services.** (States, Districts)
6. **Develop learning technology plans in consultation with a broad group of stakeholders and according to established review cycles.** (States, Districts, Building-Level Administrators)

7. **Leverage public/private partnerships and community collaboration to bring broadband internet access to previously under-connected areas and ensure student access to "everywhere, all-the-time learning."** (States, Districts, Building-Level Administrators)
8. **Develop processes and structures that ensure the inclusion of accessibility as a component of procurement processes.** (States, Districts, Building-Level Administrators)
9. **Plan for and incorporate skills and expectations across all grade levels and subject areas for Digital Health, Safety, and Citizenship, and Media Literacy.** (States, Districts, Building-Level Administrators)



Closing the Digital Access Divide

California District Takes Systemic Approach to Equitable Access

In Lindsay Unified School District (LUSD)—a small, rural district located in the Central Valley of California—approximately 93 percent of the students identify as Hispanic/Latino and 42 percent as English Learners; 24 percent receive migrant services; and all students receive free meals. The district has committed to ensuring every learner has the best learning experience daily. Since 2007, this dedication has manifested in system-wide investments in time, resources, and technology to support high-quality, personalized learning in face-to-face and virtual learning environments.

LUSD refers to its students as learners, codifying their active role in their education. The district refers to teachers as learning facilitators who guide learners toward targeted, relevant resources, providing direct support to unique learning needs and designing personalized learning pathways through which learners produce evidence of their learning to demonstrate mastery of relevant standards and skills. The district's approach is inspired by the core belief that preparing learners for their future requires dramatically rethinking educational practices. In 2018, a collaborative project with Transcend Education, Summit Public Schools, and the Center for Public Research and Leadership at Columbia University developed a series of learner actions and experiences, and corresponding educator actions and strategies that exemplify high-quality personalized instruction. LUSD maximizes its use of technology to support this vision and ensure learning is always available everywhere. In 2015, LUSD leaders recognized that providing and encouraging extended learning opportunities would require internet and device access outside of school. Given their rural location, they realized this would require a community solution. As a result, they launched a multi-year project to install nine distribution towers across the district to expand the district's network. They then placed hundreds of hotspots in people's homes to provide free, filtered coverage for all learners. In addition, the district installed cell towers to connect LTE-enabled devices. They collaborated with and engaged critical stakeholders throughout the process, gathering input from students, educators, school leaders, parents, neighbors, business owners, and the local government.

From this experience, LUSD leaders prioritized clarity, transparency, and communication. They developed "SMART" (specific, measurable, attainable, realistic/reasonable, and timely) objectives, shared them publicly, and referred to them regularly to establish a clear and common understanding. The District Director of Technology and 21st Century Learning consistently communicated with stakeholders and iteratively revised messaging to ensure they understood the project's purpose and what would be necessary to ensure success. In addition, the director collaborated with the Chief Business Officer to ensure financial sustainability. The district recognized funding would shift over time and wanted to ensure infrastructure could be installed and maintained. Most importantly, LUSD leadership ensured that every technology decision aligned with the district's vision for learning—all learners can learn, acquire knowledge in different ways and timeframes, and have access to future-focused learning. By the time the COVID-19 pandemic hit in the Spring of 2020, LUSD knew that all their learners had a device, and almost 100 percent had sufficient internet access. Equally important, given the district's embrace of blended learning to personalize instruction, learners had the skills to navigate digital content independently, and educators had the resources and the experience to support them virtually. The district had recognized that providing internet and device access was only the foundation for bridging the digital access divide and had taken steps to address the challenge. As a result, it was well-positioned for the pandemic transition to online learning.

Begin with the End Goal in Mind: Design Portraits of Learning Environments

Just as states and school systems can find value in developing Profiles of a Learner/Graduate and Profiles of an Educator, they can also build a common vision through the development of Portraits of Learning Environments. Setting such expectations for the qualities of all learning spaces—physical and digital—can help ensure equity of access, consistency of experience, and clear expectations of functionality and interoperability when procuring/developing new resources. Designing a Portrait of a Learning Environment can ensure all learning environments have the capacity and resources necessary to shift and meet the needs of all learners and learning goals. In developing such portraits, states, and districts might begin with the questions like those below.

TECHNOLOGY QUESTIONS IN THE DEVELOPMENT OF PROFILES OF LEARNING ENVIRONMENTS:

1. What aspects of environmental design are necessary to make realizing the system's Profile of an Educator and Profile of a Graduate/Learner possible?
2. How might learning environments be designed to accommodate current and anticipated technological needs, e.g., power supplies, projection capabilities, broadband speeds, and auditory assistance?
3. What standards or certifications of accessibility and interoperability will be required as part of procurement processes to ensure accessibility?
4. How might learning environments be flexibly designed to allow educators and learners to move between the whole group, small group, and individual learning experiences afforded by technology?
5. How can all learning environments be designed with adaptability for varying learner needs and abilities?

For examples of other considerations when setting expectations for learning environments, consider UDL Tips for Designing an Engaging Learning Environment, *The Third Teacher*, or Seven Principles for Classroom Design: The Learning Space Rating System. While these and other resources can assist in thinking through the totality of the learning environment, closing the digital access divide will be a key component in those environments being able to support learners fully.

Three Components of Access: Availability, Affordability, Adoption

Availability: Is there sufficient infrastructure and coverage to deliver reliable, high-speed wired or wireless broadband service and technology tools for learning?

Affordability: Can learners and families/caregivers pay for the total cost of maintaining reliable, high-speed broadband service and technology tools for learning?

Adoption: Do learners and families/caregivers have the information, support, and skills to obtain regular, adequate access to reliable, high-speed broadband service and technology tools for learning?

Readers should refer to the DEER publication's executive summary for a look into what comprises each component.

Defining the Digital Access Divide

The digital access divide refers to the unequal distribution of access to digital technologies, such as computers, the internet, and other digital tools, between historically marginalized learners and their peers. It is closely related to digital equity, which aims to address and overcome this divide to ensure all individuals and communities have the information technology capacity necessary for full participation in the society and economy of the United States.[107] The digital access divide often both mirrors and exacerbates existing educational inequalities. Students without adequate access to digital resources struggle to participate fully in online learning, access educational materials, collaborate with peers, or develop the digital skills and literacies needed for post-graduation success. These disparities can impact a student's ability to participate fully and benefit from digital learning opportunities often taken for granted by their historically better-resourced peers.[108] [109] [110] [111] [112]

Digital Access Divide Components

Accessibility: Accessible learning materials include print- and technology-based educational materials—textbooks and related core materials—designed or enhanced in a way that makes them usable across the widest range of learner variability, regardless of format (e.g., print, digital, graphic, audio, video). Accessible learning materials can include a wide range of features to support user needs, such as text-to-speech, closed captioning, magnifying screen content, ALT-text, and speech recognition. Many of these features are helpful for all users, not just those with disabilities. For instance, text-to-speech tools are beneficial not only for students with dyslexia but for students who wish to listen to complete readings while in transit.[113] Digital learning technologies can be either the gateway to learning opportunities for individuals with disabilities or a gatekeeper blocking them from accessing the same quality of learning experiences as their peers. Too often, digital learning materials fall into the latter category instead of the former.

Digital Infrastructure (inside and outside of school): Access to reliable internet connectivity and broadband services in different geographical areas varies greatly, especially in economically disadvantaged communities. State and federal government support has made significant progress in providing reliable, high-speed internet access to school buildings. According to Education Superhighway, 99.3 percent of America's schools have a reliable, high-speed broadband connection.[114] However, many students still lack access to reliable, high-speed

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107 U.S. Department of Education, Office of Educational Technology, Advancing Digital Equity for All: Community-Based Recommendations for Developing Effective Digital Equity Plans to Close the Digital Divide and Enable Technology-Empowered Learning, Washington, D.C., 2022.

108 Attewell, P. (2001). The first and second digital divides. Sociology of education, 74(3), 252-259. http://doi.org/10.2307/2673277

109 Cuban, L., Kirkpatrick, H. & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. American Educational Research Journal, 38(4), 813–834. https://doi.org/10.3102/00028312038004813

110 Hohlfeld, T. N., Ritzhaupt, A. D., Dawson, K., & Wilson, M. L. (2017). An examination of seven years of technology integration in Florida schools: Through the lens of the Levels of Digital Divide in Schools. Computers & Education, 113, 135–161. https://doi.org/10.1016/j.compedu.2017.05.017

111 Reich, Justin and Mizuko Ito. (2017). From Good Intentions to Real Outcomes: Equity by Design in Learning Technologies. Irvine, CA: Digital Media and Learning Research Hub.

112 Project Tomorrow. (2022). Beyond the homework gap: Leveraging technology to support equity of learning experiences in school. https://tomorrow.org/speakup/pdfs/Beyond-the-Homework-Gap-2021-Equity-in-Education-Report.pdf

113 (2023, January 20). *The Importance of Teaching All Students About Tech Accessibility Features*. Edutopia. Retrieved August 14, 2023, from https://www.edutopia.org/article/tech-accessibility-features-k-12-schools/

114 (2019, October 22). *2019 State of the States Report*. Education SuperHighway. Retrieved August 14, 2023, from https://www.educationsuperhighway.org/wp-content/uploads/2019-State-of-the-States-Full-Report-EducationSuperHighway.pdf

internet at home, hindering their ability to participate in "everywhere, all-the-time learning," first described in the 2017 NETP. According to the U.S. Census Bureau, 13 percent of American households have no broadband internet subscription.[115] Some students may have limited home internet access (via cellular or satellite), likely inadequate for educational purposes due to data caps, inconsistent or low-quality connectivity, and slow speeds. Other students may only be able to access the internet while at the homes of friends or other family members or in public locations such as restaurants. Still others may share their connection with other members of the household.

Digital Learning Devices: The availability and quality of digital learning devices available to students varies from district to district and even school to school. Some students and teachers may have access to school system-issued devices at school but not at home. Some students may have personally owned devices they can use for learning, while others may not. Other students may only have access to old or outdated equipment at school or home, limiting their ability to participate in digital learning experiences. In some cases, students may have to share devices with other children or adults in the family, making it difficult to complete homework and continue their learning outside school hours.

Equity Considerations for Student Devices

When configuring devices for students to take home, be aware of potential unintended consequences of device management policies and software. For instance, IT management policies that "lockdown" devices in the name of cybersecurity may also prevent students from configuring their devices to meet their learning needs, such as configuring accessibility features. School systems that use software platforms to monitor student online behavior may create privacy-related equity issues. Students with personally owned devices at home can use the internet without school system monitoring, while students who rely solely on school-issued devices do not have the same opportunity. Consider carefully balancing device security and statutory requirements with device usability and equity considerations.

Digital Health, Safety, & Citizenship: Digital Health, Safety, and Citizenship refers to the ability of individuals to maintain a healthy and empowered relationship with technology and the digital world while using technology appropriately, responsibly, and safely. It encompasses digital literacy, defined as 'the skills associated with using technology to enable users to find, evaluate, organize, create, and communicate information; and developing digital citizenship and the responsible use of technology.'[116] Knowledge and skill inequities in this area can negatively impact student ability to navigate and use digital tools effectively, potentially impacting their readiness for the workforce and post-graduation success. Digital health, safety, and citizenship skills empower students to use technology meaningfully and safely.

Cultural Responsiveness: When selecting and implementing edtech tools, schools and districts can often overlook whether those tools are culturally relevant, responsive,[117] and sustaining for all intended users. This can include the design, development, and implementation of educational tools, resources, and platforms that grow from and are tailored to the cultural backgrounds, identities, and experiences of diverse learners.

115 (n.d.). *Why We Ask Questions About...Computer and Internet Use*. United States Census Bureau. Retrieved September 6, 2023, from https://www.census.gov/acs/www/about/why-we-ask-each-question/computer/

116 Museum and Library Services Act of 2010, Pub. L. 111-340, 22 Dec. 2010.

117 U.S. Department of Health and Human Services (n.d.). *Cultural Responsiveness*. Child Welfare Information Gateway. Retrieved August 14, 2023, from https://www.childwelfare.gov/topics/systemwide/cultural/

A 2021 report from the National Academies of Science, Engineering, and Medicine, *Cultivating Interest and Competencies in Computing: Authentic Experiences and Design Factors*, made the following set of recommendations for the development of computing programs:

1. Program designers should be intentional in the design and implementation of programs offering authentic learning experiences that build interest and competencies for computing.
2. Practicing teachers in schools and facilitators in out-of-school time settings should seek out opportunities and materials that suggest how to incorporate effective practices for creating authentic learning experiences in computing within an existing program that includes utilizing problem and project-based learning strategies, allowing learner choice among activities, and which takes into consideration learners' contexts outside of school time.
3. Preservice and in-service teacher educators and trainers of out-of-school time facilitators should ensure that educators and facilitators are equipped to engage learners in personally authentic learning experiences in computing. This includes providing ongoing opportunities for educators to learn and practice using inclusive pedagogical approaches, as well as having access to materials and resources that build on learners' interests, identities, and backgrounds.
4. School leaders should consider a variety of ways to provide access to authentic learning experiences for computing. These include (1) addressing challenges (e.g., lack of instructional time and teacher expertise) associated with integrating authentic computing experiences into instruction in a variety of subjects, (2) increasing access to stand-alone computing courses, and (3) ensuring schools have adequate resources such as equipment, reliable broadband internet, and time.
5. Program providers in out-of-school settings should increase efforts to expand access to authentic learning experiences for computing through growth of opportunities and active program promotion within underserved communities and in rural areas. This includes considering ways to reduce barriers to participation such as time, cost, and transportation. It also includes offering programs multiple times or during the evening and weekends, reducing program costs or offering financial assistance, and subsidizing transportation.
6. Program evaluators should develop and apply robust models of evaluation that take into account the distinctive features of authentic learning experiences in computing. More specifically, this includes attending to personal and professional authenticity, considering connections across settings, and to the extent possible, disaggregating findings and examining differences between and within groups (e.g., gender, race, ethnicity, socio-economic status) for computing outcomes as a central part of model building and evaluation.
7. There should be a broad-based effort to cultivate a network of opportunities, as well as supports for learners to navigate between them both in and out of school to increase access and opportunities for sustained engagement with computing.[118]

118 National Academies of Sciences, Engineering, and Medicine. 2021. Cultivating Interest and Competencies in Computing: Authentic Experiences and Design Factors. Washington, DC: The National Academies Press. https://doi.org/10.17226/25912

The report defines authentic as "close approximations to the work that a…professional would engage in" and "...connected to real-world problems learners' care about and the challenges they face." In addition to this full report, systems working to ensure edtech and teaching practices are culturally responsive, relevant, and sustaining might find resources like the Kapor Center's Culturally Responsive-Sustaining CS Framework helpful as they begin this work. While both examples focus more narrowly on computing and computer science, the principles and frameworks on which they are built are applicable to technology use across disciplines.

Educator Support & Training: As highlighted in the previous section, the ability of educators to design powerful learning experiences supported by technology varies greatly between school systems, school buildings, and classrooms. Educators need consistent, reliable access to ongoing technical support (to ensure technology is functioning and available) and ongoing, personalized professional learning to help them design effectively with digital tools. This professional learning should meet educators where they are, no matter their current technological skill level. Some systems rely on vendors for technical support and training; however, the availability and quality of technical support and professional development opportunities, which vary greatly between edtech vendors, are factors school systems should consider as part of the procurement process. Such considerations may include asking vendors how they can help educators understand how new products might interact with or support previous purchases or adoptions or how included training may go beyond initial startup and into learning design.

Closing the digital access divide requires careful planning and funding to address infrastructure gaps in order to provide equitable access to internet connectivity both in and outside of school. Sustainability planning is essential as devices purchased with pandemic-related federal and state funding reach end-of-life and need replacement. Without planning for sustainability, the digital access divide – which narrowed due to these one-time funding sources – will again begin to widen. In this section, we'll discuss how districts can address these challenges.

The Role of State and District Edtech Directors

According to a 2021 analysis published by the Exchange, it is estimated that the U.S. federal government, states, and school districts collectively spend between $26 and $41 billion per year on edtech materials (including digital instructional materials, networks and devices, formative and summative assessments, and professional development for educators).[119] Despite this, many states and districts lack a cabinet-level department of education or administrative position—a state or district edtech director—to help ensure digital tools' meaningful and cost-effective use. According to research from the State Educational Technology Directors Association, 45 percent of states don't have a specific office coordinating edtech. In the 55 percent that do, that office has a variety of names, leadership roles, and placement within the broader organizational structure. Eight states call it the "Office of Educational Technology." This office falls under or adjacent to academics/learning in other states. In contrast, in others, it falls under or adjacent to information technology.[120]

119 (2021, March 15). *OVERVIEW: U.S. K-12 Public Education Technology Spending.* The Exchange. Retrieved August 14, 2023, from https://edtechevidence.org/wp-content/uploads/2021/07/FINAL-K12-EdTech-Funding-Analysis_v.1.pdf

120 (2022, September 7). *2022 State EdTech Trends Survey and Report.* SETDA. Retrieved August 31, 2023, from https://www.setda.org/priorities/state-trends/#:~:text=Download%20Report%20Here

The responsibilities for State Educational Technology Directors can include:

- Developing and implementing strategic plans for edtech deployment and implementation;
- Providing leadership, advocating for policies and funding that support the effective use of edtech in schools and districts;
- Lending support and guidance in response to rapidly changing technological landscape and cybersecurity needs;
- Proactively identifying challenges and finding innovative solutions to improve educational outcomes through technology;
- Collaborating with cross-agency staff, government officials and stakeholders to develop deeper understanding, guidelines, standards, and regulations governing the use and funding of technology in schools;
- Assessing the effectiveness and impact of technology investments;
- Ensuring the effective implementation of technology and professional learning for educators and IT staff;
- Coordinating with both general and special education leaders;
- Fostering collaboration, networking opportunities and knowledge sharing among educators, universities, businesses, and other organizations; and
- Evaluating the impact of technology initiatives on student outcomes, instructional practices, and administrative processes.

By leveraging statewide or district purchasing power to negotiate favorable vendor contracts, edtech directors can secure significant savings in procuring edtech hardware, software, and services. The sharing of technology resources and services among school systems and buildings, including infrastructure, software licenses, and digital learning tools, can reduce resource duplication and costs. Edtech directors can help develop model processes and guidelines for device refresh policies based on state and local funding structures. They can also provide context-specific and nuanced guidance in education and technology policy areas, such as student data privacy, to policymakers and school district leaders. By bridging the gap between technology and pedagogy, edtech directors can help break down the silos that can prevent the effective use of edtech while ensuring the wise use of public funds.

A state or district edtech director should be familiar with pedagogy and best practices in IT management. A well-rounded edtech director will have the capacity to actively bridge pK-12 education with IT management by understanding instructional design, assessment/evaluation, professional development, technology integration, instructional design, learning theories, digital content management, Learning Management Systems, and mobile learning solutions while also understanding data security and privacy, infrastructure management, budget and resource allocation, data-driven decision-making, vendor/contract management, stakeholder engagement/communication, and accessibility.

By bridging the gap between policy, practice, and technology implementation, state edtech directors help ensure that edtech initiatives align with state and district needs and goals.

Deeper Dive: Accessibility

Accessibility refers to designing and developing educational materials, resources, and technologies in a way that enables equal access and participation for all students, including students with disabilities. It also involves creating inclusive learning environments that accommodate students with diverse needs and ensuring that all students can effectively participate in educational activities.

- **Accessibility Features:** Features which afford a person with a disability the opportunity to acquire the same information, engage in the same interactions, and enjoy the same services as a person without a disability, in an equally effective and equally integrated manner, with substantially equivalent ease of use.[121]
- **Assistive Technology (AT):** Technology designed to address specific barriers learners with disabilities may face when they interact with their materials. Examples of assistive technology include text-to-speech, screen readers, and speech recognition.[122]
- **Accessible Educational Materials (AEM):** Print- and technology-based educational materials, including printed and electronic textbooks and related core materials that are designed or enhanced in a way that makes them usable across the widest range of learner variability, regardless of format (e.g., print, digital, graphic, audio, video, braille).[123]

Although technology can increase and enhance educational access for learners, it can also create barriers for learners with disabilities. For example, students with visual impairments who cannot modify the font size of a digital tool or who do not have the option to have the text read aloud to them might be unable to engage with the material. A student with a hearing impairment might be unable to access the content in an uncaptioned video or engage with tools that include meaningful sounds. A student who uses a screen reader might be unable to read a pdf document if it lacks proper structure, headings, alternative text for images, or logical reading order. In addition, a student with disabilities may physically need AT to access digital tools (for example, using an external switching device and scanning software instead of a mouse and keyboard.) For learners to meaningfully participate in their education, they must be able to access and engage with their educational materials.

Center on Inclusive Technology & Education Systems

Funded by the Office of Special Education Programs and managed by CAST, the Center on Inclusive Technology & Education Systems (CITES) supports districts in creating and sustaining inclusive technology systems that serve all students, including students with disabilities who require assistive technology or accessible educational materials. A framework of evidence-based practices to enhance the successful use of technology to foster learning and life success is in development. Visit https://cites.cast.org/more/district-examples to read stories and vignettes of districts implementing inclusive technology practices.

121 Joint Letter US Department of Justice and US Department of Education, June 29, 2010, & CAST.
122 (n.d.). What is Accessibility? CAST. Retrieved August 14, 2023, from https://aem.cast.org/get-started/defining-accessibility
123 (n.d.). What is Accessibility? CAST. Retrieved August 14, 2023, from https://aem.cast.org/get-started/defining-accessibility

Key aspects of accessibility in educational tools can include:

1. **Physical accessibility:** Edtech developers should design platforms and materials so students with physical disabilities can navigate them. For example, some students may need to use alternative input devices. These devices allow individuals with mobility impairments to access or control computers or mobile devices without relying on traditional keyboards and mice. Examples can include sip-and-puff switches, eye-gaze tracking systems, and specialized keyboards.
2. **Visual accessibility:** Edtech tools and materials should accommodate students with visual impairments. Examples include compatibility with screen magnification software and screen reader software, high contrast settings that enhance visibility, or descriptions of visual elements within educational materials.
3. **Auditory accessibility:** Several features can make educational tools accessible to students with hearing impairments. Examples include captions, American Sign Language or transcripts for audio or video content, visual aids such as slides, diagrams, or visual illustrations, which can supplement spoken information and enhance understanding, and speech-to-text software. Classroom amplification systems can help students better understand spoken classroom instruction.
4. **Cognitive accessibility:** Cognitive accessibility features help improve the clarity of information for all students, including those with cognitive disabilities or learning differences. Examples include text-to-speech and voice recognition software, text highlighting tools, graphic organizers, language simplification tools that provide alternative versions of complex language or text with reduced vocabulary or simpler syntax, and interactive and multisensory learning opportunities.
5. **Digital accessibility:** Digital accessibility ensures that edtech, digital tools, and educational materials are accessible to students with disabilities. Educational institutions should adopt user interfaces that are compatible with assistive technologies, adhere to web accessibility standards (such as WCAG 2.2), ensure mobile applications are accessible to individuals with disabilities, and provide customization and personalization options.
6. **Language Accessibility:** Accessible language accommodates people with Limited English Proficiency, defined as individuals who do not speak English as their primary language and who have a limited ability to read, speak, write, or understand English.124 Examples include providing multilingual versions of digital content, the ability to raise or lower the readability level of content, and creating audio and video content that accommodates users with limited literacy skills.

To better meet diverse language needs, states like Massachusetts (page 52) and Florida (page 67) have designed their educational technology resources to better reach and serve students who are English Learners and multilingual students and their families.

124 Civil Rights Division of the United States Department of Justice (n.d.). *Commonly Asked Questions and Answers Regarding Limited English Proficient (LEP) Individuals*. LimitedEnglishProficiency.gov. Retrieved August 14, 2023, from https://www.lep.gov/sites/lep/files/media/document/2020-03/042511_QA_LEP_General_0.pdf

Achieving the goal of truly inclusive and accessible learning environments requires the participation of and input from a wide range of stakeholders—including the instructional technology, curriculum, special education, and information technology teams. Often, these departments are siloed and do not regularly work together to ensure all students' needs are met. As a result, situations like the following may arise:

- An Individualized Education Program (IEP) Team completes a functional evaluation and determines that a student needs a specific screen reader software. The IEP Team Chair puts in a request for the software, and the district purchases it. When the learner tries to use the software with their district-provided laptop, it does not work because no one ensured that the software was compatible with the operating system installed on student laptops or because the software is internet dependent, and the student doesn't have home internet access.
- A general education teacher finds a digital resource purchased by the district that uses videos and games to teach math skills. The teacher assumes the technology is accessible since the district purchased it but quickly finds the videos do not provide closed captioning or transcripts for students. As a result, it doesn't support learners who are deaf and hard of hearing and those with specific learning disabilities. The teacher is frustrated and uncertain about how to support these students.
- A caregiver with a visual disability is trying to access the list of after-school programs on their child's school website. When they reach the website, the after-school programs are listed as images with no additional information or alternative text. The caregiver cannot use their text-to-speech program to review the list and learn what opportunities are available for their child.

School systems must break down these silos when planning, implementing, and evaluating technology purchases. It's also important to include learners with disabilities and their families in these conversations to ensure the technology purchased meets the needs of the students who need it most. This is especially important for learning technologies students use outside of school hours. The more knowledgeable caregivers are about how specific technologies can support their child, the better prepared they will be to support their child's learning at home.

Increasing Statewide Support of Accessible Educational Materials

For New Hampshire, 2024 marks the state's final year as a member of an inaugural cohort of states working to "build a robust and coordinated system for providing AEM and related technologies to all learners with disabilities who need them." Funded by a grant from the US Department of Education Office of Special Education Programs, the cohort connects New Hampshire, Georgia, Missouri, North Carolina, Oklahoma, Oregon, and West Virginia with the National Center on Accessible Educational Materials for Learning (AEM Center). The effort provides cohort members with intensive technical assistance in helping learners with disabilities from early childhood through postsecondary education. The resources developed from the project will be made available nationally through the AEM Center and provide examples of how states can improve accessibility services while providing educators with the capacity to close the digital design divide for all learners.

Another key consideration is to provide educators with the time and training needed to understand the various accessibility features of digital learning tools and how to leverage them. Many accessibility features can benefit all students, not only those with specific disabilities. For example, digital textbooks and e-books can give students flexible access to course materials. Features like searchable text, interactive multimedia, highlighting, digital note-taking capabilities, adjustable font sizes, and captioning can facilitate learning for all students.

Supporting Preschool Children with Assistive Technology

To empower early childhood educators to use evidence-based assistive technology with even the youngest learners, the Miami-Dade County Community Action & Human Services Head Start Program in Florida is partnering with two organizations with external assistive technology specialists. Florida Alliance for Assistive Services & Technology (FAAST) is a nonprofit organization whose mission is to improve the quality of life for Floridians with disabilities by increasing access to assistive technology through empowerment and collaboration. Step Up AT is a customizable professional development program that coaches teachers, teacher assistants, teacher support specialists, school districts, and other agencies to adopt evidence-based AT practices that improve early learning outcomes for young children (ages 3-5) with disabilities.

The program aims to help educators plan for and use AT to support preschool students aged three to five with IEPs or students who otherwise need support. By helping educators match AT with tasks and student strengths, they can more actively engage students in their learning. The Step Up AT team has also created learning modules in English and Spanish describing how to plan for AT, developed teaching practices with guidance from the Council for Exceptional Children's Division of Early Childhood, and videos demonstrating how to use the AT. The learning modules help preschool administrators, such as those with Head Start, get AT where needed and become better advocates for students with disabilities.

PHYSICAL LEARNING SPACES

Another important consideration is the organization of physical learning space. While the guidelines below refer to on-campus learning spaces, it's also important to consider the role of off-campus learning spaces (such as the students' homes). Considerations include:

- Are on-campus learning spaces accessible to students with physical disabilities? For example, are there accessible ramps or elevators and a proposed number of accessible restrooms for student use?
- Are the design and layout of the physical space dynamic and flexible enough to accommodate different learning activities? Can a space where educators deliver whole-class instruction be modified to facilitate individual or small-group activities? For example, flexible furniture, movable partitions, and modular setups can support easy classroom reconfiguration.

- Can physical learning spaces facilitate both individual and collaborative work? Are there areas designed explicitly for group work and collaboration, such as breakout rooms or collaborative workstations? Are there quiet areas or zones for students who need fewer auditory distractions for individual study?
- Are learning spaces equipped with the necessary technology infrastructure to support the desired learning environment(s)? Examples include Wi-Fi access points, A/V equipment, and laptop storage/charging carts. Does this extend to different classroom contexts, such as providing Wi-Fi access for outdoor classrooms?

For more information and tools for aligning physical spaces, visit the Blended Learning Universe.

Puerto Rico Focuses on STEM Learning for All

Founded in 2004, Puerto Rico's Science, Technology, and Research Trust is on a mission "to continually advance Puerto Rico's economy and its citizen's well-being"[125] through its three main pillars of research & development, entrepreneurship, and public health. The Trust also recognizes the need to support a pipeline of access to STEM learning for all students on the island if it is to succeed in its mission. The Trust's STEM Education Program focuses on STEM education public policy, strategic partnerships, and supporting the local STEM education ecosystem. The program includes activities such as STEM in the Mountain, a weeklong summer program that offers hands-on STEM learning to 5th through 8th grade students. To meet students where they are, the program has also developed STEM Boxed Kits delivered to students' homes. The kits provide everything necessary to provide access to experiential STEM learning and begin to build early pathways to STEM careers.

125 https://prsciencetrust.org/

For digital devices and tools to be effective, usable, and meaningful, they must be accessible to all. The following strategies can help school systems ensure the accessibility of their digital infrastructure:

- Develop a procurement team including IT staff, assistive technology specialists, special and general education staff, curriculum leaders, procurement directors, and EL specialists to create an accessibility rubric the district must use before procurement.
- When possible, hire an AT specialist who can support the evaluation, procurement, training, and implementation of AT, IT, or AEM or work with an organization (such as an Education Service Agency) to do so. If this is not possible, work with the State AT Act program or community partners (e.g., Easter Seals and local groups) to contract the appropriate AT specialist or EL specialist.
- When needed, hire an EL specialist who can support the evaluation, procurement, training, and implementation of technology tools to support students and families/caregivers no matter their home language.
- Ensure all educators have the knowledge, time, and capacity to ensure all educational materials are accessible—including websites, classwork and homework, and communications to staff and families. Accessible materials should be available both internally and externally for all constituents. Consider the accessibility training modules from the U.S. Department of Education's AEM Center and the digital accessibility video series from the U.S. Department of Education Office for Civil Rights.

- Provide opportunities for various experts and specialists (e.g., IT, special educators, EL specialists, general educators, and related service providers) to discuss and collaborate on evaluating, implementing, and using edtech and AT in the classroom.
- Partner with State AT Act Programs, which provide free AT loans for learners with disabilities before purchasing. For more on AT, see the AT section below.
- Develop an easily findable and searchable directory with all district technology resources and their accessibility features (including language translation services) and all available district assistive technology.
- Ensure all district and school forms, event registrations, and meetings include areas for participants and attendees to indicate accessibility needs before events and meetings. Translate school communications into multiple languages, reflecting the needs of students and families in specific communities.[126]
- When discussing their needs and services, include potentially impacted individuals in all teams, committees, and meetings.
- Form standing groups inclusive of caregivers, students with disabilities, parents, or family members of students with disabilities, and ELs to advise on issues of accessibility and technology procurement and provision. Wherever possible, create specific structured connections between these and all professional groups mentioned above.

126 U.S. Department of Education (2015, January 7). *Information for Limited English Proficient (LEP) Parents and Guardians and for Schools and School Districts that Communicate with Them.* Office for Civil Rights. Retrieved September 6, 2023, from https://www2.ed.gov/about/offices/list/ocr/docs/dcl-factsheet-lep-parents-201501.pdf

State Partnership Brings Assistive Technology Support to Oklahomans

The Oklahoma State Department of Education (OSDE) has partnered with Oklahoma ABLE Tech, the state's Assistive Technology (AT) Act program, to provide AT and information services for children. ABLE Tech provides training, technical assistance, information, and public awareness to help individuals with disabilities, their caregivers/families, service providers, and agencies so they can learn about and improve AT service delivery for students with disabilities. ABLE Tech also provides AT demonstrations, short-term loans, re-utilized devices, and alternative financing options to help Oklahomans make informed decisions about AT devices and acquire needed AT for free or at a reduced cost.

ABLE Tech helps local educational agencies increase skills, knowledge, and competencies related to AT laws, policies, procedures, and practices. They support the quality provision of AT devices and services for students with disabilities, helping them be more independent in the least restrictive environment and progress toward academic standards. ABLE Tech supports districts in implementing the Quality Indicators for AT (QIAT) Service Delivery in the Schools and the Quality Indicators for the Provision of AEM and Technology in the Schools. At the state level, ABLE Tech staff have provided expertise on multiple panels, councils, and committees in areas including assessment, data, MTSS, and procurement, resulting in the extension of AT services.

Due to increased OSDE funding, AT demonstrations and short-term AT loans for educational purposes have increased over the past decade, supporting the AT needs of thousands of Oklahomans, from infants to adults.

ACCESSIBILITY RESOURCES

By considering accessibility in educational tools, educators and developers can create inclusive learning experiences that address the needs of all students, promoting equal opportunities for participation, engagement, and achievement. For more on accessibility, consider resources such as the following:

- OET Digital Accessibility Webpage: OET launched a new landing page for accessibility resources and funding opportunities available in the U.S. Department of Education.
- Digital Accessibility Video Series: The U.S. Department of Education Office for Civil Rights created 20 brief videos on the importance of accessibility and how to create digitally accessible materials.
- Accessibility Guide for Creating Materials: The National Research and Training Center on Blindness and Low Vision developed simple how-to guides to ensure your documents, QR codes, and surveys are accessible.
- Accessibility Resources for Developers & Document Authors: The Social Security Administration shares resources they use to create accessible digital content, including a web accessibility testing tool, how to add alternative text, and accessibility checklists.

- The Office of Special Education Programs, part of the Office of Special Education and Rehabilitative Services, is dedicated to improving results for infants, toddlers, children, and youth with disabilities ages birth through 21 by providing leadership and financial support to assist states and local districts. Resources include Tools for Your Toolbox and information about Section 508 Accessibility.
- OCR Digital Accessibility Web Page: The U.S. Department of Education Office for Civil Rights provides a landing page for guidance and technical assistance about educational institutions' legal obligations with respect to digital accessibility.

By considering the accessibility of educational tools, educators and developers can create inclusive learning experiences that address the needs of all students, promoting equal opportunities for participation, engagement, and achievement.

Deeper Dive: Digital Infrastructure

Digital infrastructure refers to the resources that make digital systems possible, as well as how individuals and organizations access and use these resources.[127] It includes various components and networks supporting the transfer, storage, and communication of data and digital resources. In education, digital infrastructure can include:

- **Hardware and devices:** These include computers, laptops, tablets, and other devices that provide access to digital learning materials and platforms.
- **Reliable, high-speed internet connectivity:** This is defined by the federal government as 100 megabits per second (Mbps) symmetrical network capacity.[128]
- **Learning Management Systems (LMS)**: Learning Management Systems are online platforms for managing and delivering course materials, assignments, assessments, and educational content.
- **Online Content and Resources:** These can include e-books, interactive multimedia resources, educational videos, online tutorials, and virtual simulations.
- **Communication & Collaboration Tools:** These tools, such as video conferencing and shared document editing platforms, support positive relationship building between students and educators.
- **Assessment and Feedback Systems:** These systems are used for online assessments, quizzes, and exams and may include tools for automated grading.
- **Data Management and Analytics Systems:** These systems collect, manage, and analyze data related to student performance, engagement, and learning outcomes.
- **Cybersecurity and Privacy Protections:** These include hardware and software tools such as web filtering, firewalls, encryption, and secure authentication.

127 Borrowing from the USAID's definition in their August 2022 Digital Ecosystem Framework: https://www.usaid.gov/sites/default/files/2022-05/Digital_Strategy_Digital_Ecosystem_Final.pdf

128 (n.d.). *USDA to Make Up to $1.15 Billion Available to Help People Living in Rural Communities Access High-Speed Internet.* U.S. Department of Agriculture. Retrieved August 14, 2023, from https://www.usda.gov/media/press-releases/2021/10/22/usda-make-115-billion-available-help-people-living-rural

Digital infrastructure sets the stage for educational design, which empowers students and educators to leverage technology for effective teaching and learning. On-campus access to these resources and tools is not enough; students and educators also need access when off-campus to fully realize the potential of "everywhere, all-the-time" learning. This vision is shared by the Federal Communications Commission (FCC), which announced its Learn Without Limits initiative in June 2023[129] to support off-campus access. In 2023, the U.S. Department of Education's Office of Educational Technology began releasing a series of technical assistance briefs to provide technical assistance to state and district leaders. These briefs, in addition to those resources provided by the Student Privacy Policy Office and the Cybersecurity & Infrastructure Security Agency offer robust assistance to ensure preparedness of educational digital infrastructure.

Digital Infrastructure Beyond Schools

Despite significant growth in school technology use, many learners, families/caregivers, and communities still lack access to reliable, high-speed broadband and technology tools. In the United States, more than 18 million households continue to face challenges gaining access to reliable, high-speed broadband, and households earning less than $30,000 per year are significantly less likely to have a computer than households making more than $100,000.[130] While 40 percent of K-12 learners identify as Black, Hispanic, or Native American, a disproportionately greater percentage of unconnected learners (54 percent) identify as Black, Hispanic, or Native American. Furthermore, Black and Hispanic learners are less likely to have a computer at home compared to white peers.[131] Overall, an estimated 15–16 million K-12 learners do not have sufficient access to reliable, high-speed broadband and technology tools for learning.[132]

Advancing Digital Equity for All

In Spring 2022, the U.S. Department of Education's Office of Educational Technology committed to advancing digital equity through the Digital Equity Education Roundtables (DEER) Initiative. Through DEER, The Office of Educational Technology hosted a series of national conversations with leaders from community-based organizations, families, and learners furthest from digital opportunities. The resource "Advancing Digital Equity for All: Community-Based Recommendations for Developing Effective Digital Equity Plans to Close the Digital Divide and Enable Technology-Empowered Learning" illuminates insights from these conversations to highlight the barriers faced by learner communities and promising solutions for increasing access to technology for learning.

129 Federal Communications Commission (2023, June 26). *Chairwoman Rosenworcel Announces 'Learn Without Limits' Initiative*. Commission Documents. Retrieved September 6, 2023, from https://www.fcc.gov/document/chairwoman-rosenworcel-announces-learn-without-limits-initiative

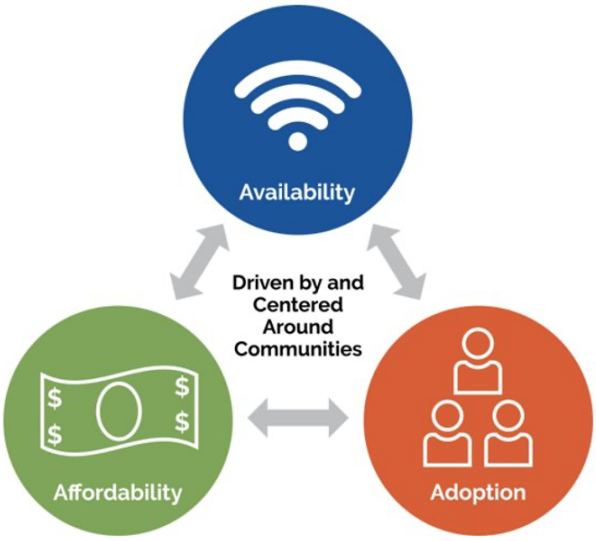
130 DigitalUS Coalition. (2020). Building a digitally resilient workforce: Creating on-ramps to opportunity. https://digitalus.org/wp-content/uploads/2020/06/DigitalUS-Report-pages-20200602.pdf

131 Rideout, V.J. & Robb, M.B. (2021). The Common Sense Census presents: Research brief. Remote learning and digital equity during the pandemic. San Francisco, CA: Common Sense. https://www.commonsensemedia.org/sites/default/files/featured-content/files/final_release_digital_equity_research_brief_fact_sheet.pdf

132 Ali, T., Chandra, S., Cherukumilli, S., Fazlullah, A., Galicia, E., Hill, H., McAlpine, N., McBride, L., Vaduganathan, N., Weiss, D., & Wu, M. (2021). Looking back, looking forward: What it will take to permanently close the K-12 digital divide. San Francisco, CA: Common Sense Media. https://www.commonsensemedia.org/sites/default/files/featured-content/files/final_-_what_it_will_take_to_permanently_close_the_k-12_digital_divide_vfeb3.pdf

Although the inequity of digital access has been a long-standing problem for United States school systems and communities, the COVID-19 pandemic brought these challenges to the forefront when educators were forced to implement emergency remote learning. Many students did not have access to personal computers, laptops, or tablets at home, making it challenging to participate in online classes and complete assignments. Students with limited or unreliable home internet access had difficulty accessing educational resources and participating in high-bandwidth activities such as videoconferencing. Other factors contributing to inequitable learning experiences included inadequate professional learning and technical support; and home environmental challenges such as insufficient space, noise distractions, or lack of a suitable study/teaching area. Students with disabilities faced additional challenges accessing online content not properly designed for accessibility.[133] The severity of these issues varied based on factors such as socioeconomic status, geographical location, and the resources available in individual school systems. These challenges existed before the pandemic and continue to contribute to educational inequities.

The causes of the digital divide are nuanced and complex but can be categorized into three components of access: availability, affordability, and adoption.



AVAILABILITY

Is There Sufficient Infrastructure and Coverage to Deliver Reliable, High-Speed Wired or Wireless Broadband Service and Technology Tools for Learning?

Availability refers to the level and sufficiency of coverage in delivering reliable, high-speed wired or wireless broadband services and the sufficiency of technology tools for learning. Barriers and strategies related to availability align with typical understandings of "access," focused on whether learners and their families/caregivers can connect to reliable, high-speed broadband through a device, and the necessary physical infrastructure from home and in their communities. Research shows that the quality and type of home broadband access directly impacts learner school participation,[134] performance outcomes, and digital literacy.[135] Learners with insufficient access are also less likely to plan for postsecondary education, affecting their lifetime potential for high earnings.[136]

133 (n.d.). *Types of Disabilities and Associated Barriers*. Toronto Metropolitan University Pressbooks. Retrieved August 14, 2023, from https://pressbooks.library.torontomu.ca/dabp/chapter/types-of-disabilities-and-associated-barriers/

134 (2019). Learning at Home While Under-Connected: Lower-Income Families during the COVID-19 Pandemic. *New America*. https://eric.ed.gov/?id=ED615616

135 Hampton, K.N., Fernandez, L., Robertson, C.T., & Bauer, J.M. (2020). Broadband and Student Performance Gaps. James H. and Mary B. Quello Center, Michigan State University. https://doi.org/10.25335/BZGY-3V91

136 Hampton, K.N., Fernandez, L., Robertson, C.T., & Bauer, J.M. (2020). Broadband and Student Performance Gaps. James H. and Mary B. Quello Center, Michigan State University. https://doi.org/10.25335/BZGY-3V91

Access to devices suitable for learning, such as laptops, Chromebooks, and tablets, is another critical consideration for school systems. Lower-income families are less likely to own personal devices appropriate for learning; Pew research found that a quarter of low-income teens lack access to a computer at home.[137] Even if there is a computer in the home, it may have to be shared by multiple family members, including other school-age children. In addition, while many digital tools are web-based, they may not work equally well on all devices—for example, an educational tool might work in a computer web browser but not on a tablet. School systems purchasing digital tools need to ensure they will work on a wide range of devices (including smartphones) and are compatible with devices provided by the school system. If school systems provide students with devices to take home, they must budget for device replacement cycles (generally every 3-5 years),[138] repairs, and technical support.

While there is no single solution to address the internet and device availability challenges many students face, school systems and states are finding creative solutions appropriate for their specific context. Advancing Digital Equity for All highlights some of

Physical Accessibility

Features allowing individuals with mobility impairments to access or control computers or mobile devices without relying on traditional keyboards and mice

Visual Accessibility

Features that accommodate individuals with visual impairments

Auditory Accessibility

Features that accommodate individuals with hearing impairments

Cognitive Accessibility

Features that help improve the clarity of information for all individuals including those with cognitive disabilities or learning differences

Digital Accessibility

Features ensuring that technologies, digital tools, and educational materials are accessible to students with disabilities

Language Accessibility

Features supporting individuals who do not speak English as their primary language or who have a limited ability to read, speak, write, or understand English

137 (2020, March 16). *As schools close due to the coronavirus, some U.S. Students face a digital 'homework gap'.* Pew Research. Retrieved August 14, 2023, from https://www.pewresearch.org/short-reads/2020/03/16/as-schools-close-due-to-the-coronavirus-some-u-s-students-face-a-digital-homework-gap/#:~:text=One%2Din%2Dfour%20teens%20in,according%20to%20the%202018%20survey.

138 Institute for Education Sciences (n.d.). *Forum Unified Education Technology Suite: Part 6: Maintaining and Supporting Your Technology.* National Center for Education Statistics. Retrieved August 14, 2023, from https://nces.ed.gov/pubs2005/tech_suite/part_6.asp

these solutions in detail. Examples include providing digital devices and wireless hotspots for learners, installing wireless networks on school buses, partnering with internet service providers (ISPs) to provide community internet access, and leveraging community partnerships to provide internet access in public spaces.

In the long term, bringing reliable, high-speed broadband to underserved areas requires infrastructure development, policy initiatives, and cooperative efforts among various stakeholders. Collaboration between governments (local, state, federal, and tribal), ISPs, community agencies, nonprofit organizations, chambers of commerce, industry and trade associations, and other stakeholders is crucial for successful broadband deployment. Public-private partnerships can leverage private-sector investment in broadband infrastructure to benefit larger communities.

Partnering with Local Government and Community Agencies with HCS EdConnect

When schools transitioned to emergency remote learning in 2020, the Chattanooga, Tennessee community recognized that many students lacked the home internet access necessary to participate. To address the challenge, Hamilton County Schools (HCS), Hamilton County, the City of Chattanooga, the Enterprises Center of Chattanooga, and various local funders partnered to provide free, reliable, high-speed internet access to qualifying Hamilton County families. They named the partnership HCS EdConnect.

Identifying students and families who needed home internet access and encouraging them to participate in the program was the biggest challenge HCS faced. Initially, the school system reached out to students who qualified for Free and Reduced Price Meals. As of Spring 2023, more than 16,000 students were connected to reliable high-speed internet at no charge, representing approximately one-third of the students in the district. The school system continues working to identify families that have not yet opted into this free service.

Anecdotal information from teachers, students, and parents indicates that reliable high-speed internet access at home has made a difference for program participants. Boston University is implementing a qualitative research study to study the program further. Preliminary research findings indicate nearly all the families participating in HCS EdConnect reported positive attitudes toward the use of technology in education.

AFFORDABILITY

Can Learners and Families/Caregivers Pay for the Total Cost of Maintaining Reliable, High-Speed Broadband Service and Technology Tools for Learning?

Affordability refers to the ability to pay for the cost of installing and maintaining a reliable, high-speed broadband connection and technology tools for learning.[139] High internet service costs disproportionately impact low-income families, who may struggle to allocate funds for internet service while meeting basic needs such as food, gas, shelter, and electricity. This barrier also exists at the community level, particularly for Tribal communities.[140] In addition, a lack of competition between providers in many areas results in higher prices and lower-quality service.

139 U.S. Department of Education, Office of Educational Technology, Advancing Digital Equity for All: Community-Based Recommendations for Developing Effective Digital Equity Plans to Close the Digital Divide and Enable Technology-Empowered Learning, Washington, D.C., 2022.

140 U.S. Department of Education, Office of Educational Technology, Advancing Digital Equity for All: Community-Based Recommendations for Developing Effective Digital Equity Plans to Close the Digital Divide and Enable Technology-Empowered Learning, Washington, D.C., 2022.

The cost of devices suitable for learning also challenges families. Lower-cost devices like Chromebooks or refurbished computers can meet the needs of some students but are not suitable for all learners and may need to be shared by multiple family members. Older machines that use operating systems that have reached end-of-life or have limited memory or processor speeds may be unable to run newer applications. Learners with disabilities might have access to assistive technology and devices at school but not at home due to cost. Challenges like these can make it difficult for students to participate in "everywhere, all-the-time" learning.

Collaboration and Research Lay the Foundation for CT State Digital Equity Plan

Prior commitments and policies designed to close the digital divide have helped accelerate the development of Connecticut's Digital Equity Plan, led through its Department of Administrative Services' Commission for Educational Technology.[4]

During the pandemic, the state's governor established the Everybody Learns initiative, which included purchasing and rapidly deploying more than 140,000 student computers and provisioning 50,000 home internet connections. During the same period, the state passed legislation that gave Connecticut advanced insights into the digital divide. Public Act 21-159 established a statewide broadband mapping hub with provider data reflecting nearly universal availability but only a 75 percent adoption rate of high-speed service across the state. These insights enabled Connecticut to focus on the economic, behavioral, and trust barriers to achieving digital equity.

Research into these barriers has come through strong interagency collaboration and partnerships with the University of Connecticut's School of Public Policy and local stakeholder groups. Intensive focus group discussions, statewide resident surveys, and detailed indexing of existing programs point to the need for broader access to training and support for residents, and trusted resources that equip them with affordable connections and devices that meet their needs. While still in development, Connecticut's Digital Equity Plan will aim to put solutions in place that leverage efficiencies at the state and regional level while capitalizing on local partners that have earned the trust of residents to engage fully in today's digital world for learning, work, health, and wellbeing.

Bringing Internet Access to Alaskan Tribal Lands

While the digital access divide may be closing quickly in much of the country, geography and a lack of physical infrastructure present unique challenges in those locations still waiting for reliable broadband. Through a $35M grant from the National Telecommunications and Information Administration's Tribal Broadband Connectivity Program, 73 Alaska Native Tribal governments, Alaska Native Corporations, and tribal organizations will benefit from a Use and Adoption award.

Beginning with a needs assessment and input from target populations, the project will eventually increase access to connectivity and devices. Recognizing that digital health, safety, & citizenship are key components of digital access, the project will also include designing and implementing a training program to build digital skills and familiarity with broadband resources and technology among Alaskan Native populations.

When completed, the project will serve 62 Alaskan Native communities, provide subsidized internet service for an estimated 2,777 Alaskan Native households, provide broadband devices to an estimated 8,877 individuals, and employ and train 10 IT technicians. This is to say nothing of the increased educational opportunities, employment upskilling, and digital cultural possibilities that will be available for generations to come.

Initiatives and partnerships at the federal, state, and local levels can help mitigate the affordability barriers to internet access. In December 2021, Congress authorized the Affordable Connectivity Program (ACP), a $14B program, to ensure all households can afford broadband for education, employment, and more. The ACP allows qualifying households to reduce their internet costs by up to $30/month ($75/month on Tribal lands). Under the White House's Get Internet initiative, several companies further committed to offering ACP-eligible households at least one high-speed plan for $30/month or less, with no additional fees and no data caps. Similarly, state and local initiatives have partnered with ISPs to provide services and devices at a lower cost.[141]

Although programs like those described above can help address affordability issues, more resources and expanded eligibility for affordable broadband programs are still needed. Even with subsidies, devices, and reliable, high-speed internet, plans are still unaffordable for many families. The low-cost broadband plans available may not be robust

Office of Educational Technology and Federal Communications Commission ACP Outreach Toolkit and Resources for Schools and Districts

As trusted community members, schools and districts are encouraged to engage in outreach to eligible families/caregivers. In doing so, schools and districts can use the FCC's outreach toolkit, with resources translated into multiple languages. In addition, schools and districts can take steps to help learners, families, and caregivers navigate the sign-up process. To access the toolkit and OET's resources for schools and districts, please visit https://getinternet.gov/.

141 U.S. Department of Education, Office of Educational Technology, Advancing Digital Equity for All: Community-Based Recommendations for Developing Effective Digital Equity Plans to Close the Digital Divide and Enable Technology-Empowered Learning, Washington, D.C., 2022.

enough to meet the needs of learners, especially when multiple family members need to use the connection simultaneously. Eligibility restrictions such as immigration and refugee status may also prevent families from participating. Credit checks, deposit requirements, and long-term contract requirements may also pose barriers. In addition, these programs do not address the challenges of homeless or migrant students or students who move frequently. Highly mobile learners need reliable, high-speed broadband connections that do not require them to be in a specific location. Some programs like ACP protect consumers by allowing eligible households to access the benefit regardless of credit status, past due balances, or prior debt.[142]

VT Purchasing Consortia Increases Spending Power of Rural Districts

Vermont has a total student population of approximately 83,000—equal to that of a single large urban school district—spread out across several districts within the state. But the smaller size of these often-rural districts doesn't stop them from provisioning access to technology tools at a fair price for all students. Through Vita-Learn, a statewide non-profit dedicated to professional learning, innovative practices, and improved use of edtech, member districts can take advantage of these tools at fractions of the price any of the smaller districts or schools could negotiate on their own. Consortia like Vermont's can also create the secondary benefit of a common set of tools used across districts in a region or state, increasing the chance an educator or student moving from one district to another will have familiarity with these tools and decreasing the costs in time and money in getting new teachers up to speed with a school or district's array of resources.

142 (n.d.). *Frequently Asked Questions*. USAC Affordable Connectivity Program. Retrieved September 6, 2023, from https://www.affordableconnectivity.gov/help/faqs/

Washington State Grant Program Builds District Capacity for Edtech Use

Seventy percent of Washington's school districts are categorized as rural/remote and are often less likely than their urban counterparts to adequately raise sufficient local funding to support digital teaching and learning. In 2021, Washington HB 1365 established the "Digital Equity and Inclusion Grant" program to fund districts in three primary areas: attaining a 1:1 student-to-learning device ratio, expanding technical support and training for educators, and developing district-based and school-based capacity to assist families and students. With this recent charge from the state legislature, the Washington Office of Superintendent of Public Instruction (OSPI) actively helps rural/remote districts, which cannot often apply for and manage grants.

Several small, rural, and remote districts have benefitted from the dedicated funds and additional assistance from OSPI. Hoquiam School District, a remote community located on the state's Western edge, received grant funds for professional learning equipment but needed more internal capacity to support the effective integration of technology into instruction. OSPI worked with district leaders and brought in technology directors from peer districts to share resources and solve issues collaboratively.

OSPI's work on the Digital Equity and Inclusion Grant program demonstrates how dedicated funding and technical assistance for rural/remote and small districts allows them to build the technological and human capacities necessary to meet the specific needs of their communities.

ADOPTION

Do Learners and Families/Caregivers Have the Information, Support, and Skills to Obtain Regular, Adequate Access to Reliable, High-Speed Broadband Service and Technology Tools for Learning?

Adoption refers to the process by which an individual obtains broadband access at the necessary speed, quality, and capacity; and the digital skills necessary to participate online, on a personal device, and using a secure and convenient network. Barriers and strategies related to adoption tend to focus on human-level challenges and strategies. They go beyond whether reliable, high-speed broadband is available and affordable to focus on whether the necessary information, support, and skill-building opportunities are provided.[143]

Providing students with the devices and high-speed internet needed for learning outside school hours is not enough. Focusing on family/caregiver digital inclusion and skills development is equally important. For example, communication between schools and families often relies heavily on digital tools such as email, online portals, or messaging apps. When families/caregivers lack digital literacy skills, it becomes more challenging for schools and teachers to effectively communicate important information, updates, or individual student progress. This gap in skills can hinder parental engagement, making it difficult for schools to establish strong home-school partnerships and build trust. In addition, families/caregivers without digital literacy skills may not know how to help educate their children about digital health, safety, and citizenship. Without family guidance, students may be at a higher risk of encountering online dangers or engaging in inappropriate online behavior. (See Digital Health, Safety, and Citizenship for more information.)

143 U.S. Department of Education, Office of Educational Technology, Advancing Digital Equity for All: Community-Based Recommendations for Developing Effective Digital Equity Plans to Close the Digital Divide and Enable Technology-Empowered Learning, Washington, D.C., 2022.

Digital equity and adoption are intersectional issues. The most successful strategies involve dialogue with various stakeholders, including government agencies, community anchor institutions, community-based organizations, tribes, private companies, impacted community members, families/caregivers, and students.

Digital Harbor Foundations Serves as an Example of Long-Term Innovation Investment

Originally "born in Baltimore and dedicated to creating pathways to opportunity through technology,"[144] Maryland's Digital Harbor Foundation has expanded its efforts globally since opening its Tech Center in a defunct recreation center in 2013. Dedicated to digital equity for everyone, diversity in the tech sector, innovative STEM education, and technology for the public good, Digital Harbor's Center of Excellence works "directly with school districts, communities, classroom teachers, and out-of-school educators to scale best-in-class STEM learning opportunities to ensure all students have access to these transformative learning opportunities."[145] These efforts include educator professional development, community workshops, and a digital learning hub launched in 2023 "aimed at reaching more than 100 educators to provide content that empowers them to build youth digital literacy." Digital Harbor also provides fiscal support to national and international efforts such as the Ukraine Math & Science Achievement Fund. "In addition to undergraduate scholarships," the fund provides "flexible funding that responds to students' dynamic circumstances, as well as infrastructure gifts."[146] The Digital Harbor Foundation is an example of what's possible when public-private partnerships focus on closing the digital divides.

144 (n.d.). Our History. Digital Harbor Foundation. Retrieved September 6, 2023, from https://digitalharbor.org/our-history/
145 (n.d.). *Center of Excellence.* Digital Harbor Foundation. Retrieved September 6, 2023, from https://digitalharbor.org/center-of-excellence/
146 (n.d.). *About Us*. Ukraine Math & Science Achievement Fund. Retrieved September 6, 2023, from https://ukraineachievementfund.org/about/

Similar to the cultural sensitivity required in selecting edtech tools mentioned above, building trust is a key component of digital adoption and literacy education. Members of historically marginalized communities often do not trust federal and state governments and private companies. Factors such as immigration status and a history of discrimination against LGBTQI+ individuals may cause families/caregivers to be wary of sharing information. Some Indigenous communities distrust government agencies and systems due to past and current exclusionary practices.[147] Families/caregivers who had negative experiences with low-cost connectivity programs in the past (such as poor service, unexpected fees, or required credit checks) may also be reluctant to apply for them again. Language and cultural barriers can also pose challenges to adoption.

Accurate data is another important component of digital adoption. At the outset of the COVID-19 pandemic, many school systems did not have accurate information about home internet connectivity and use, making it difficult to know which learners might have trouble participating reliably in emergency remote learning and why. For instance, surveys about home internet access and devices must be carefully worded and administered to ensure the accuracy of the data collected. A household might report access to devices and the internet, but that connectivity might be limited to a single phone.

147 U.S. Department of Education, Office of Educational Technology, Advancing Digital Equity for All: Community-Based Recommendations for Developing Effective Digital Equity Plans to Close the Digital Divide and Enable Technology-Empowered Learning, Washington, D.C., 2022.

Providing Multilingual Digital Literacy Support for Learners, Families, and Caregivers

Located just outside of Portland, Oregon, the Beaverton School District serves more than 40,000 students, approximately 24 percent of whom identify as Latino. When the schools first launched their 1-to-1 program in 2014, they discovered not all students had equitable access to reliable, high-speed internet at home. They then implemented several strategies to help bridge the gap. As they began the work, they soon discovered many of their Spanish-speaking parents and guardians could not be contacted via email, creating barriers to communication. Some parents had never created an email address, while others had one but rarely used it and didn't provide it to the school. Realizing they needed to engage their Spanish-speaking parent community with digital literacy and citizenship education, the district began hosting monthly Latino parent technology nights in Spanish in collaboration with their community liaison.

To publicize the event without relying on email or other digital communication tools, district personnel recorded a message about the event in Spanish that was sent to parents by the school autodialer. They also recruited student volunteers from their Latinos Unidos club to spread the word about the parent night to the broader community. The district helped remove attendance barriers by providing on-site daycare, refreshments, and interpreters. The goals of the events were to help parents stay abreast of district activities, improve communication with their child's teachers, and help parents support their children with digital citizenship information. The district also provided hands-on computer training at every meeting, teaching such tasks as:

- Establishing email accounts
- Accessing student attendance and academic records
- Navigating the school district web page and accessing it in Spanish
- Practicing locating essential information
- Communicating follow-up information for parent and caregiver support

By cultivating the digital skills of their Spanish-speaking families over several years, Beaverton has been able to improve communications and create a more participatory and inclusive school culture.

Electronically administered surveys requiring an internet connection may actually exclude the people needing the most help. While many school systems use Free and Reduced Lunch eligibility as a proxy indicator for poverty, it may not provide an accurate picture of home internet connectivity and use unless combined with survey data. Through qualitative research, district leaders have reported that some families prioritize internet access despite income level, and vice versa.[148] Inaccurate data can lead to funding and program decisions which widen the digital divide.

Supporting digital adoption among families/caregivers is a complex, multifaceted challenge that requires multi-stakeholder collaboration and iterative processes to address. However, the benefits to learners and their families and the opportunity to build school/home relationships make it worthwhile.

148 Katz, V., & Rideout, V. (2021, June 24). *Learning at home while under-connected*. New America. https://www.newamerica.org/education-policy/reports/learning-at-home-while-underconnected/

Deeper Dive: Digital Health, Safety, and Citizenship

In the early days of digital connectivity, the internet was called the "information superhighway"— apt metaphor for considering digital health, safety, and citizenship for students and educators. Like a highway, internet access can take users to many places. Some provide tremendous opportunities for learning, community building, socialization, and exploration. Others are potentially harmful or dangerous. In the same way young drivers must learn the rules before getting behind the wheel, districts should plan to build digital health, safety, and citizenship skills before providing access to connectivity and devices.

In addition to in-school concerns about digital health, safety, and citizenship, schools face increased concerns with out-of-school access. Although school and district networks use content filtering per federal requirement, 94 percent of 8-18-year-olds have a smartphone[149] provided by their families, not by a school or district, often with unfiltered, 24/7 internet access. Students often use digital devices long before they set foot on a school campus and from a very young age. The 2023 U.S. Surgeon General's advisory on social media and youth mental health, the American Psychological Association's health advisory on social media use in adolescence, and news headlines discussing the challenges of student phone use in schools have raised key concerns about social use of technology distracting from schooling or contributing to negative peer dynamics. Schools face growing pressure to attend to the larger context of student technology use and concerns surrounding it, even outside of school hours and on commercial digital platforms.

Students and families can benefit from guidance in navigating the safe and healthy use of digital platforms and devices, both in and out of school. According to a 2022 report from Common Sense Media, 43 percent of children ages 8-12 have a smartphone. Nearly 40 percent use social media even though age 13 is generally the required minimum age used by social media platforms in the United States.[150]

Despite being concerned over their children's social and recreational technology use, many adults admit to not setting the best example. More than 3 out of 5 (62 percent) parents surveyed by MyVision said their tech use influences their children, and 72 percent feel it's a negative influence.[151] A majority of parents report that their phone can get in the way of spending quality time with their children; roughly seven in ten parents (68 percent) say they are at least sometimes distracted by their smartphone, with 17 percent saying this happens often.[152] The MyVision survey found that 65 percent of parents do not monitor their screen time use,[153] and research found a significant association between parental phubbing (the act of snubbing a physically present person in favor of a mobile phone) and student academic performance.[154] Given the challenges adults face

149 (2021, August 18). *The Common Sense Census: Media Use by Tweens and Teens*. Common Sense Media. Retrieved August 14, 2023, from https://www.commonsensemedia.org/sites/default/files/research/report/8-18-census-integrated-report-final-web_0.pdf

150 The minimum required age set by social media platforms is informed by the Children's Online Protection and Privacy Act that requires social media platforms to collect verifiable parental consent before collecting, storing, and sharing data from children under age 13. Source: Federal Trade Commission. (2023, February 3). Children's Online Privacy Protection Rule ("COPPA"). Federal Trade Commission. Retrieved from https://www.ftc.gov/legal-library/browse/rules/childrens-online-privacy-protection-rule-coppa

151 (n.d.). *Survey Finds Parents' Screen Use Has Negative Influence on Children*. MyVision.org. Retrieved August 14, 2023, from https://myvision.org/guides/survey-finds-parents-concerned-over-kids-screen-time/#struggles

152 Parenting Children in the Age of Screens: (n.d.). *Parenting in the Age of Screens*. Pew Research. Retrieved August 14, 2023, from https://www.pewresearch.org/internet/2020/07/28/parenting-children-in-the-age-of-screens/#:~:text=Fully%2071%25%20of%20parents%20say,same%20about%20developing%20healthy%20friendships.

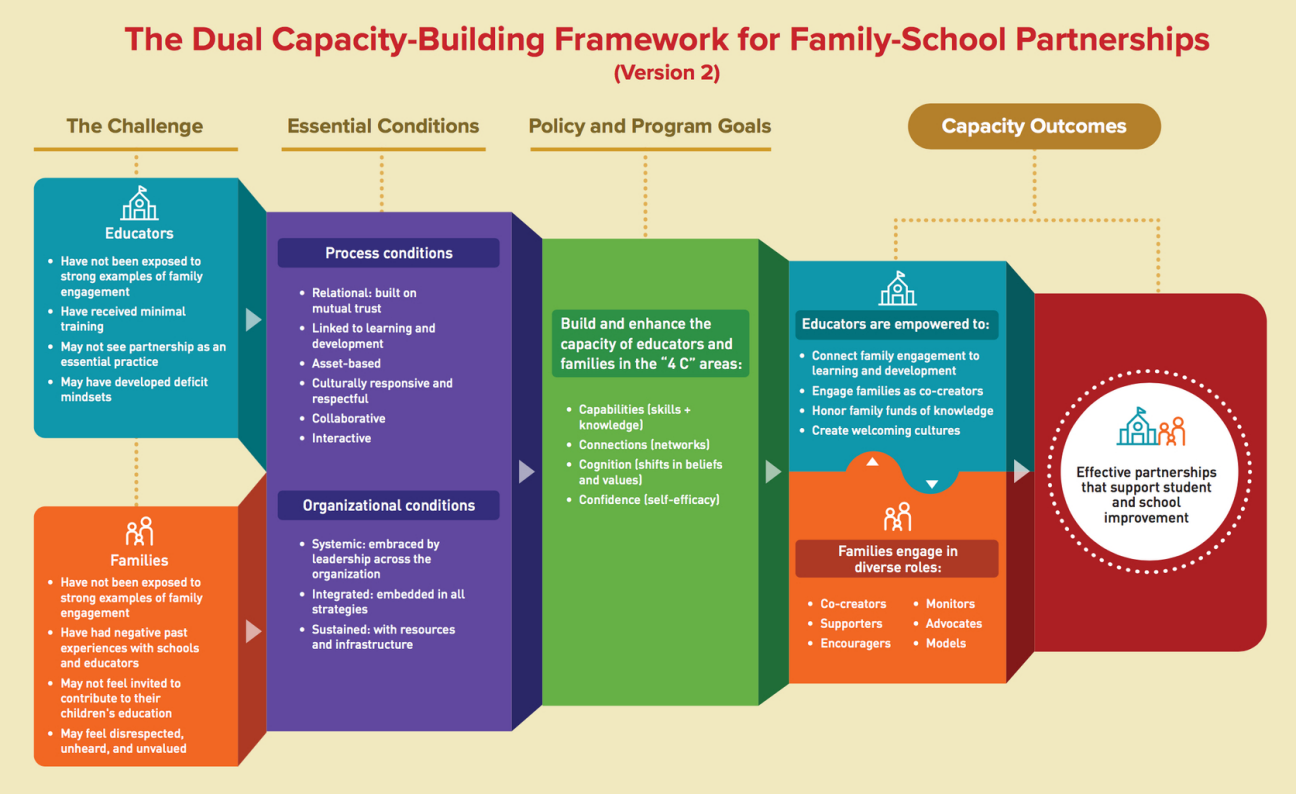
153 (n.d.). *Survey Finds Parents' Screen Use Has Negative Influence on Children*. MyVision.org. Retrieved August 14, 2023, from https://myvision.org/guides/survey-finds-parents-concerned-over-kids-screen-time/#struggles

154 Jiang, Y., Lin, L., & Hu, R. (2023). Parental phubbing and academic burnout in adolescents: The role of social anxiety and self-control. *Frontiers in Psychology*, 14. https://doi.org/10.3389/fpsyg.2023.1157209

managing digital device use,[155] it is essential for schools and parents to work together to help students develop these critical digital health, safety, and citizenship skills.

Students may already be "driving" before they get to school, but without having the necessary knowledge and skills to do so safely and wisely. Just as parents and families play a significant role in student academic achievement, they also play a significant role in the development of student technology habits, making it all the more important that schools and families work together to benefit students.

As community organizations, schools are uniquely positioned to help bridge this gap in understanding and may need guidance in seeking to communicate about out-of-school activities and habits. The National Center on Safe, Supportive Learning Environments cites the Dual Capacity-Building Framework for Family-School Partnerships to support the development of family engagement strategies, policies, and programs. The framework outlines the challenges, essential conditions, policy and program goals, and capacity outcomes for building family-school partnerships. While the framework was designed for building family-school partnerships more broadly, it is well suited for digital health, safety, and citizenship capacity building among educators, families, and students. Key to the framework is an understanding that both schools and families/caregivers have areas of growth in building their capacities to communicate and collaborate in supporting student learning.



155 (2023, July 27). *The Insidious Habit That Can Hurt Your Relationship*. New York Times. Retrieved August 14, 2023, from https://www.nytimes.com/2023/07/27/well/family/phubbing-phone-snubbing-relationship.html

Digital Health: The ability of individuals to maintain a healthy and balanced relationship with technology and the digital world.

Digital Safety: Protecting individuals from online risks and ensuring their privacy and security while using digital technologies.

Digital Citizenship: Appropriate, responsible behavior when using technology.

By approaching digital health, safety, and citizenship education holistically and engaging families as partners, school districts can build the capacity of both parents and students to use technology wisely. There has been considerable research on the importance of parent/caregiver involvement and the importance of fostering school-family partnerships to enhance the academic, social, and emotional learning for children and adolescents.[156] Bringing parents/caregivers into the conversation about digital health, safety, and citizenship can support students while building the school-family relationships critical for academic success. Conversely, by helping students and families differentiate between productive and non-productive online activities and engaging them in more nuanced conversations about digital health, safety, and citizenship, educators can build the capacity of their entire school community to use technology meaningfully and wisely.

Kansas District Takes Planned Approach to Digital Citizenship

When leaders of Wichita Public Schools considered how they would build digital citizenship into the learning of every student, the 94-site district knew they needed to take a measured approach. The result was a 3-year plan that focused on middle schools the first year, elementary the second, and high schools the third. The district developed common teaching strategies and provided professional learning for teachers to build their capacity. The team leading the charge included the district's Chief Information Officer, Digital Literacy Coordinator, and 12 instructional learning coaches/primary digital citizenship coaches. The core team meets monthly to share new resources, provide professional development, share best practices, address challenges, and offer collaborative support. Keys to Wichita's success include identifying expert teachers to lead professional learning and offering insights and alignment to state standards and initiatives such as computer science, social emotional learning, computer literacy, and media literacy.

156 Patrikakou, E. (2015). Relationships Among Parents, Students, and Teachers: The Technology Wild Card. *Procedia - Social and Behavioral Sciences*, 174, 2253-2258. https://doi.org/10.1016/j.sbspro.2015.01.883

DIGITAL HEALTH

Digital Health and well-being refers to the ability of individuals to maintain a healthy and balanced relationship with technology and the digital world. It recognizes the benefits of technology and the potential negative impacts of excessive or unhealthy technology use, including strategies to help promote physical, mental, and emotional well-being in digital usage. Some aspects of digital health include:

- **Mindful Technology Use:** Technology serves many different purposes. It can support formal learning (such as students using synchronous editing software to collaborate with others on a class project) and interest-driven informal learning (such as the student who learns how to knit from YouTube and online forums). It can also be used casually or socially (such as playing video games or scrolling through social media). Mindful technology users are thoughtful and intentional about how they use technology. They know how digital interactions impact mental and emotional well-being and are intentional about the volume and content of their digital media engagement.
- **Setting Digital Boundaries:** Setting boundaries is an important aspect of technology use. Roughly six in ten parents say they spend too much time on their smartphones, while a third say they spend too much time on social media.[157] Similarly, students working on homework assignments can easily get distracted by social media notifications and quickly find themselves off task. Learning to manage and limit these distractions and balancing online and offline activities is a valuable collection of skills and habits. Educating parents about strategies such as creating family media plans, device-free family dinners, and plugging in devices in a centralized location at night can help build the capacity of the entire family to engage appropriately with digital media.
- **Maintaining Healthy Sleep Routines:** Research shows that the light emitted by digital devices can interfere with sleep, especially before bedtime.[158] Digital health emphasizes the importance of maintaining a healthy sleep routine, including avoiding screens for at least an hour before sleep and keeping electronic devices out of the bedroom to improve sleep quality and overall well-being. Healthy sleep routines can play a key role in academic success.[159]

Research in this area is ongoing. The Digital Wellness Lab, the American Academy of Pediatrics (AAP) Center of Excellence on Social Media and Youth Mental Health, and the Harvard Center for Digital Thriving are resources updated regularly with the latest evidence and recommendations.

157 (2020, July 28). *Parenting Children in the Age of Screens*. Pew Research. Retrieved August 14, 23, from https://www.pewresearch.org/internet/2020/07/28/parenting-children-in-the-age-of-screens/

158 Ricketts, E. J., Joyce, D. S., Rissman, A. J., Burgess, H. J., Colwell, C. S., Lack, L. C., & Gradisar, M. (2022). Electric lighting, adolescent sleep and circadian outcomes, and recommendations for improving light health. *Sleep medicine reviews*, 64, 101667. https://doi.org/10.1016/j.smrv.2022.101667

159 CDC Sleep and Health: https://www.cdc.gov/healthyschools/sleep.htm#:~:text=Children%20and%20adolescents%20who%20do,poor%20mental%20health%2C%20and%20injuries.&text=They%20are%20also%20more%20likely,poor%20academic%20performance%20in%20school

Incorporating Hawaiian Values and Digital Citizenship into Computer Science Education

Hawai'i is a culturally unique state. To help ensure that its educational system and content are culturally relevant and connected to Hawaiian values, the Hawai'i Department of Educatio (HI DOE) developed the Ha Framework, a state-wide framework to develop the skills, behaviors, and dispositions consistent with of Hawai'i's unique context and honor the qualities and values of its indigenous language and culture. When state legislation mandated that Computer Science (CS) education be offered to all K-12 students, the HI DOE leveraged the Ha Framework and an existing digital citizenship initiative, Akamai Digital Citizenship: Show Aloha in Person and Online, to ensure CS offerings explored ways for individuals and communities to influence computing through their behaviors, culture, and social interactions. By incorporating computer science and digital citizenship into the Ha Framework, the HI DOE and their stakeholder team are helping ensure the new concepts are relevant to students and families.

DIGITAL SAFETY

Digital safety focuses on protecting individuals from online risks and ensuring their privacy and security while using digital technologies. Following our safe driving metaphor, digital safety is akin to understanding the "rules of the road." It involves adopting measures to safeguard personal information, avoiding cyber threats, and preventing unauthorized access to sensitive data. Digital safety also encompasses educating individuals about online dangers, such as phishing scams, identity theft, cyberbullying and online harassment, and promoting responsible digital citizenship.

Key elements of digital safety include:

- **Privacy:** Students should understand how to protect their personal information online and the importance of doing so. They should understand the risks of sharing sensitive information online, such as their full name, address, phone number, or financial information. Districts should also be transparent with students and families about activity monitoring on school system-owned devices and communicate the context and justification behind monitoring systems. As mentioned previously, emerging artificial intelligence technologies can pose privacy concerns as large language models feed on the information shared with them and should only be utilized in education systems when data privacy and anonymity can be assured and verified.
- **Cybersecurity:** Students should understand the risks of malware, phishing, hacking, and other cyber threats. Examples of good cyber hygiene include:
    - Teaching students how to create secure passphrases for online accounts (and not to share them with others).
    - Knowing how to recognize phishing emails and suspicious links and what to do when encountering them.
    - Being aware of social engineering techniques and thinking critically before sharing information with others.
    - Not downloading files from unknown sources.
    - Keeping personal devices updated with security patches.

- **Cyberbullying:** Cyberbullying is bullying that takes place over digital devices like cell phones, computers, and tablets. It can occur through SMS, text, and apps, or online in social media, forums, or gaming where people can view, participate in, or share content. Cyberbullying includes sending, posting, or sharing negative, harmful, false, or mean content about someone else. It can include sharing personal or private information about someone else, causing embarrassment or humiliation.[160]
- **Online Harassment:** Online harassment and abuse include various harmful and sometimes illegal behaviors perpetrated through technology. Online harassment and abuse take many forms, including the non-consensual distribution of intimate digital images; cyberstalking; sextortion; doxing; malicious deep fakes; gendered disinformation; rape and death threats; the online recruitment and exploitation of victims of sex trafficking; and various forms of technology-facilitated intimate partner abuse.[161]

Building Media Literacy into State Standards

Media literacy is a key component of both active use and digital citizenship, and states like Delaware are taking steps to ensure all students are engaged, analytical, and informed media consumers. The state passed S.B. 195 in 2022, requiring the inclusion of media literacy standards for K-12 classrooms. The law allows media literacy to "be incorporated into existing curricula standards" and states that "media literacy curricula is needed to guarantee the vitality of American democracy and students' ability to engage in civic life." The draft standards drawon the ISTE student standards and the American Association of School Libraries Student Standards and will be implemented in the 2024-2025 school year. Guiding the work, "The Digital Citizenship Education Act" offers the following definitions:

"Media literacy" means the ability to access, analyze, evaluate, create, and take action with all forms of communication and encompasses the foundational skills of digital citizenship and internet safety, including the norms of appropriate, responsible, ethical, and healthy behavior, and cyberbullying prevention.

"Digital citizenship" means the diverse set of skills related to participating in digital platforms, including the norms of appropriate, responsible, and healthy behavior.

160 (n.d.). *What is Cyberbullying*. StopBullying.gov. Retrieved August 14, 2023, from https://www.stopbullying.gov/cyberbullying/what-is-it

161 (2022, June 16). *Memorandum on the Establishment of the White House Task Force to Address Online Harassment and Abuse*. The White House. Retrieved August 14, 2023, from https://www.whitehouse.gov/briefing-room/presidential-actions/2022/06/16/memorandum-on-the-establishment-of-the-white-house-task-force-to-address-online-harassment-and-abuse/

DIGITAL CITIZENSHIP

Digital citizenship is appropriate, responsible behavior when using technology.[162] It encompasses the knowledge, skills, and attitudes required to navigate the digital world respectfully and responsibly. Good digital citizens engage positively and constructively in online communities and possess good digital literacy and critical thinking skills. Key elements of good digital citizenship include:

- **Responsible Online Behavior:** Digital citizenship emphasizes the importance of respectful and responsible online behavior, including treating others with kindness and empathy, being mindful of the impact of one's words and actions in digital spaces, and adhering to ethical standards. Good digital citizens understand the consequences of cyberbullying, harassment, and sharing inappropriate or harmful content.
- **Managing One's Digital Footprint and Reputation:** Good digital citizens realize that everything we do online leaves a digital footprint. They understand the importance of managing and curating one's digital presence and are mindful of the potential impact of online actions on personal and professional reputation. They understand the long-term consequences of sharing and posting personal content online.
- **Media Literacy:** Media literacy includes the skills associated with using technology to enable users to find, evaluate, organize, create, and communicate information; and developing digital citizenship and the responsible use of technology.[163] Good digital citizens can effectively and critically navigate digital spaces. They possess the ability to find, evaluate, and use information from online sources and understand how to communicate, collaborate, and create content using digital tools.
- **Understanding Copyright and Intellectual Property:** Digital citizenship promotes respect for copyright laws and intellectual property rights. It encourages proper citation and attribution when using or sharing the work of others and discourages plagiarism or copyright infringement. It also teaches students to understand their rights as content creators.
- **Algorithmic Literacy:** AI has exponentially increased the need for students to understand and be able to critically analyze algorithms and how they impact our online and offline lives. Algorithmic literacy includes knowledge of the underlying principles, processes, and biases that shape algorithms[164] and their implications for individuals, society, and decision-making. It also includes understanding how to interact effectively with AI and the ethical implications of using generative AI tools such as ChatGPT.

Teaching children and teens digital citizenship skills can help prevent cyberbullying and its negative effects. When children learn positive online behaviors, they can use social media in productive ways.

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162 (n.d.). *Digital Citizenship Skills Teach Digital Citizenship Skills to Prevent Cyberbullying*. StopBullying.gov. Retrieved August 14, 2023, from https://www.stopbullying.gov/resources/research-resources/digital-citizenship-skills

163 Museum and Library Services Act of 2010, Pub. L. 111-340, 22 Dec. 2010, https://www.govinfo.gov/content/pkg/PLAW-111publ340/pdf/PLAW-111publ340.pdf

164 Klein, A. (2023, May 10). *Ai Literacy, Explained*. Education Week. Retrieved August 14, 2023, from https://www.edweek.org/technology/ai-literacy-explained/2023/05

Southwestern Pennsylvania Engaged in Decade-long Dedication to Digital Health, Safety, and Citizenship

Allegheny County Intermediate Unit 3 supports the work and implementation of digital citizenship across 42 districts in Southwest Pennsylvania. With generous support from the Grable Foundation and in partnership with Common Sense Media, Unit 3 has worked with districts and other organizations in Greater Pittsburgh to provide innovative resources and support to help educators, families, and students develop the skills they need to harness the power of technology for learning. The partnership aims to help kids and teens in the Greater Pittsburgh area thrive as learners, leaders, and citizens in this digital age. As a result, the area has seen strong public-private partnerships and relationships, positive trends in impact data, customized support across 42 districts, and grants to support innovative learning across southwest Pennsylvania, provided by the local Remake Learning Network. Key to this success has been a strong dissemination plan, role-alike meetings held once a month, a strong professional learning plan, and inviting teachers to present with youth about their experience with the Common Sense digital citizenship resources.

Ten questions schools and districts can ask to help support students' digital health and safety:

1. Does your school or district have a clearly articulated vision of digital health and safety for students at all levels and does it account for possible risks related to student demographics?
2. How are you collecting data and evidence to better understand the digital health and safety needs of students, families, and employees within your district or schools (e.g., needs assessments, climate surveys, incident reports)?
3. What measurable goals have you established for the digital health, safety, and mental well-being of students?
4. How might students and families be included in assessing needs, setting district and school goals, and designing learning opportunities?
5. What supports are necessary and do you have in place to ensure key staff (e.g., administrators, school counselors, social workers, educators) have an adequate understanding of and capacity to respond to the unique needs involving support of student digital health and safety?
6. What emergency resources, procedures, and supports are in place to support in moments of crisis regarding digital health and safety?
7. What curricular, extra-, or co-curricular inclusion supports can be or have been established to support student digital health and safety?
8. What external relationships can be or have been established to augment school and district capacity to support student digital health and safety?
9. How do you plan to build community awareness and support of these needs, goals, and efforts?
10. What ongoing funding sources (e.g., Title II, Title IV grants) can or will you leverage to support these efforts?[165]

165 (2023, May 9). *Has Your School Had Enough?* 10 Questions Schools Can Ask to Build Better Digital Health & Safety. U.S. Department of Education, Office of Educational Technology Blog. Retrieved August 14, 2023, from https://medium.com/@OfficeofEdTech/has-your-school-had-enough-10-questions-schools-can-ask-to-build-better-digital-health-safety-d131c5d4d100

Planning, implementing, and evaluating the curricular components of question seven above requires planning that answers key questions such as those below:

- What are key expectations for digital health, safety, and citizenship actions and understandings at each grade level?
- Where will instruction in digital health, safety, and citizenship live within curricula as well as the academic day and year?

The ubiquity of social media and digital tools presents the challenge and opportunity for schools and districts to partner with families and caregivers to make sure all students have what they need to maintain their digital health and safety. By integrating digital health tools, fostering digital safety practices, and nurturing digital wellness habits, students can leverage the benefits of technology while safeguarding their physical and mental health.

PROTECTING STUDENT DATA PRIVACY

In addition to teaching students how to protect their privacy online, school officials, families, and software developers should be mindful of how data privacy, confidentiality, and security practices affect students. Schools and districts should tell students and parents what kind of student data the school or third parties (e.g., online educational service providers) are collecting and how the data can be used, and in which contexts the data can be further disclosed without their consent. In addition to any and all applicable requirements under the Family Educational Rights and Privacy Act (FERPA), education leaders should develop policies that identify who can access student data and communicate to families their rights and responsibilities concerning data collection. These policies should include formal adoption processes for online educational services and click-wrap agreements. Click-wrap agreements appear when users are asked to accept the provider's terms of service before using a website or software application. Click-wrap agreements enter the developer and the user (in this case, the school or district) into a contractual relationship akin to signing a contract. Districts should ensure district employees understand the implications of district policies governing the use of such agreements.

Several federal statutes apply to student privacy in schools. More information on each is below.

Creating a Culture of Student Data Privacy Takes Time

Not long after hiring a new Executive Director of Educational Services, Rocky River School District in Ohio recognized the need to create a system-wide culture focused on protecting student data privacy. Although the school board had recently reconfirmed its Student Privacy Policy, implementation was inconsistent. Collaborative stakeholder conversations identified the need to clearly define and educate staff about the difference between personally identifiable information (PII), confidential information, internal information, and directory information. After consultations with teacher leaders identified the need for increased training opportunities and an easier way for teachers to request digital tools, the district simplified the request process for teachers, developed an easily accessible list of pre-approved digital applications, and created a teacher-focused self-help guide.

The district found that pushback often resulted from a lack of understanding or awareness, so they provided staff with a variety of ongoing training opportunities, including in-depth professional learning sessions, faculty meeting pop-ups, monthly bulletins, explanatory videos, and privacy-protecting tips and tricks recommended by other teachers and staff. The district also built an internal website with student data privacy information and resources and designated teacher-leaders as the initial point persons for staff questions. Utilizing multiple communication channels helped get the word out. In addition, the district attorney attended staff meetings to explain the importance of data governance and tied it to their state-required Teacher Code of Ethics training.

The district also updated its textbook adoption procedures to include vetting for data governance requirements. Finally, the district applied for and earned the CoSN Trusted Learning Environment seal, an accomplishment indicating that they have taken strong, measurable steps to protect student data.

Utah Funds Student Data Privacy Office to Support School Systems

Like many states, Utah has recently updated its student data privacy laws. In 2015, Utah passed HB68, which required the Utah State Board of Education (USBE) to make recommendations for updating existing privacy laws and, critically, to develop a funding proposal to implement data privacy changes. This work led to the Student Data Protection Act in 2016, which includes requirements for local educational agencies, state educational agencies, and third-party vendors. Part of Utah's privacy efforts was the decision to create and sustainably fund a Student Data Privacy Office. In addition to a Chief Privacy Officer, the office includes a student data privacy auditor, a student data privacy project manager, and a student data privacy trainer. This combination of funding, legislation, and dedicated experts has created a sustainable student privacy system that provides local educational agency student privacy training, resources, and reporting. One case study about Utah's student data privacy attributes Utah's success to methodical collaboration between state and local leaders, ongoing dedicated funding for dedicated staff, and continual improvement. "Mandated training at the state (tied to teacher relicensure) and local levels, ongoing reporting requirements, and the development and distribution of high-quality resources by USBE's dedicated staff all serve to keep privacy top of mind."

Federal Privacy Laws and K-12 Education

FERPA (the Family Educational Rights and Privacy Act) affords parents and "eligible students" the right to inspect and review, seek to amend, and exercise some control over the disclosure of student education records maintained by educational agencies (e.g., school districts) and institutions (i.e., schools) to which funds have been made available under any program administered by the Secretary of Education. (Under FERPA, an "eligible student" is a student who has reached 18 years of age or is attending a postsecondary school at any age.) Among other things, for instance, FERPA generally requires educational agencies and institutions to obtain prior written consent from parents and eligible students before disclosing PII from education records. However, one exception to FERPA's general written consent requirement permits an educational agency or institution to disclose, without consent, PII from education records to a third party to whom the educational agency or institution has outsourced institutional services or functions, as long as certain conditions are met. Under this exception, the third party must be determined by the educational agency or institution to constitute a school official who has a legitimate educational interest in the education records under the criteria set forth in its annual notification of FERPA rights; perform an institutional service or function for which the educational agency or institution would otherwise use employees; be under the direct control of the educational agency or institution with respect to the use and maintenance of the education records; and be subject to the FERPA requirements governing the use and redisclosure of PII from education records found in 34 CFR § 99.33. For more guidance on FERPA, visit the U.S. Department of Education's FERPA resources.

COPPA (the Children's Online Privacy Protection Act) governs the online collection of personal information from individuals under 13 years of age. Before a commercial website or online service directed towards individuals under 13 years of age can collect any personal information from such individuals, the operator of such website or service must obtain "verifiable parental consent". Verifiable parental consent is also required if an operator has actual knowledge that it is collecting personal information from an individual under 13 years of age. The Federal Trade Commission (FTC), which enforces COPPA, has said that school officials can, in certain situations, provide consent on behalf of the parents as long as that consent is limited to the educational context—where an operator collects personal information from students for the use and benefit of the school, and no other commercial purpose. For more information on COPPA, please visit the FTC's COPPA FAQ website.

IDEA (the Individuals with Disabilities Education Act) includes confidentiality requirements to protect the privacy interests of children with disabilities from birth until age 21 who are referred for services under the IDEA. IDEA protects PII in the records of children referred to IDEA. IDEA requires that a parent provide prior written consent before PII is disclosed to a third party and that the parental consent is informed. There are some specific exceptions that may apply to the general rule of parental consent.

CIPA (the Children's Internet Protection Act) imposes several requirements on schools or libraries that receive E-Rate discounts for internet access. Schools and libraries must certify that they have technologies in place to block or filter internet access to content that is obscene, pornographic, or harmful to minors, and schools must also monitor the online activities of minors. The FCC's CIPA Guide offers a more in-depth understanding of CIPA requirements.

PPRA (the Protection of Pupil Rights Amendment) protects the rights of parents and students in a number of ways, some of which are summarized below. (These rights transfer from a parent to a student when the student turns 18 years old or is an emancipated minor under applicable state law.) PPRA requires that a local educational agency (as defined in PPRA) that receives funds under a program administered by the U.S. Department of Education develop and adopt local policies, in consultation with parents, on specifically enumerated privacy issues. A couple of such required local policies are summarized below. PPRA requires that such a local educational agency develop and adopt a policy, in consultation with parents, that affords parents the right to inspect, upon request, among other things, instructional materials, excluding academic tests or academic assessments, used by the local educational agency as part of the educational curriculum for a student. PPRA also requires that such a local educational agency develop and adopt a policy, in consultation with parents, regarding the collection, disclosure, or use of personal information collected from students for the purpose of marketing or for selling that information (or otherwise providing that information to others for that purpose), including arrangements to protect student privacy that are provided by the agency in the event of such collection, disclosure, or use. PPRA also requires that such a local educational agency directly notify parents of students who are scheduled to participate in activities involving the collection, disclosure, or use of personal information collected from the students for the purpose of marketing or sale (or otherwise providing that information to others for that purpose) and give parents the opportunity to opt the students out of these activities. One important exception to the foregoing PPRA requirement is that neither parental notice and the opportunity to opt-out nor the development and adoption of local policies are required for such local educational agencies to use students' personal information for the exclusive purpose of developing, evaluating, or providing educational products or services for, or to, students or schools.

Consult PTAC Recommendations

The U.S. Department of Education established the Privacy Technical Assistance Center (PTAC) as a one-stop resource to learn about privacy related to student data. PTAC provides information and updated guidance on privacy, confidentiality, and security practices through a variety of means, including training materials and direct assistance. PTAC also provides guidance on FERPA and PPRA. PTAC recently provided additional recommendations on Protecting Student Privacy While Using Online Educational Services and Transparency Best Practices for Schools and Districts.

PTAC Data Breach Scenario is intended to assist schools, districts, and other educational organizations with internal data security training. The Password Data Breach interactive exercise is aimed at district management and provides a simulated response to a district-level data breach that focuses on the processes, procedures, and skills needed to respond.

HIPAA (the Health Insurance Portability and Accountability Act) sets national standards and requirements for, among other things, the privacy of protected health information (PHI) and the security of electronic PHI. The HIPAA Privacy Rule does not apply to records that are protected by FERPA. For a better understanding of the intersection between HIPAA and FERPA, see the jointly published guidance from the US Department of Health and Human Services and the U.S. Department of Education.

Of the three digital divides, the United States has made the most progress in closing the digital access divide over the past decade. Millions more students now have access to high-speed internet and devices suitable for learning at school and at home. Educators are faced with digital ecosystems teaming with thousands of digital learning resources. In most spaces, the immediate edtech playing field is leveling. As is ever the case, overcoming these access challenges leads states, districts, and schools to more complex issues. Here, too, progress is being made. New state student data privacy laws have prompted the development of capacity-building resources to support school systems. The importance of supporting student Digital Health, Safety, and Citizenship—in and out of the classroom—is receiving national attention. Accessible and assistive technologies continue to evolve. States and districts have long recognized closing the digital access divide is an essential condition if they hope to improve the design of learning supported by technology to ensure all students are active, analytical learners.

Conclusion

As has ever been true, educational technology holds vast potential to improve teaching and learning for every student and teacher in the United States. In recent years, driven by the emergency of a pandemic, schools have found themselves with more connectivity, devices, and digital resources than at any other moment in history. This current context presents a unique opportunity.

States, districts, and schools across the country can leverage this momentum of a narrowing access divide to focus key efforts in providing all teachers the time, support, and capacity they need to design authentic learning experiences for all learners supported by this proliferation of digital tools. They can set bold new visions of the skills, knowledge, and experiences all students must have as they progress through and graduate from PK-12. Furthermore, states, districts, and schools can eliminate barriers and uncover biases in practice that have historically limited innovative and promising learning experiences supported by edtech to a predictable minority.

The nation can close the digital access, design, and use divides. The NETP includes examples from every state in the country where schools, districts, and their partners are proving it's possible. For this possibility to reach all students will require an understanding that the kinds of instructional tasks students need to prepare them for the world they will inherit cannot rely on content alone. The instructional core requires attending to both content and people.

Appendix A - Additional Digital Use Divide Examples

The examples below showcase additional states and school districts working to close the Digital Use Divide.

Supporting Teachers and Students in Van Meter, Iowa

Serving more than 1,000 PK-12 students in a single building, the Van Meter Community School District in Iowa has committed to helping educators leverage active technology use to support learning goals. Supported by a team of instructional coaches that focuses on building relationships and meeting teachers where they are, teachers are updating lessons to help students build their digital literacy skills and engage more deeply with content. For example, an annual 5th-grade project on the civil rights movement was transformed after students and teachers watched a speech by late civil rights leader Representative John Lewis and learned about his autobiographical black and white graphic novel trilogy about the civil rights movement, *March*. Inspired by his story, teachers had students use a digital storyboarding tool to create graphic novels about well-known figures in the civil rights movement, which students could share online with their families. By providing teachers with ongoing, job-embedded support, they continue to grow and improve their professional practice.

Developing a Computer Science Immersion Program in South Dakota

In 2017, Sioux Falls School District found ways to bring technology into the district. They started a five-year partnership with Code to the Future to create a computer science immersion program in three Title 1 elementary schools and two high-poverty middle schools. Code to the Future trains the teachers by having them do the assignments and projects their students will do, and then they learn to code and complete hands-on projects. By integrating coding throughout their core classes, students develop critical thinking, collaboration, problem-solving, and other skills that companies need. In addition to this program, the district also created maker spaces in some of its elementary and middle school libraries using a state innovation grant. Teachers encourage students to apply what they learn to create something in the maker space, using items like sewing machines, jewelry-making supplies, Legos, Kinex blocks, 3D drawing pens, and programming kits. Librarians say that one of their favorite outcomes is watching students teach each other how to create things.

Institute of Education Sciences Grant Funds Tool to Support Writing Instruction

Funded through a grant from the Institute of Education Sciences in 2021, Writing Architect[166] is a tool aiming to "assist teachers in connecting evidence-based writing instruction with students' needs as identified in a digital classroom written composition assessment. The goal is to improve late elementary students' written composition in response to text (informational writing) and to use assessment results more effectively for instructional purposes."[167] Led by researchers at Michigan State University and piloted in Michigan elementary schools through 2025, the project aims to create "an integrated tool that combines digital assessment of writing with differentiated instructional recommendations, and the support needed to implement differentiated writing instruction." By "gathering feedback from teacher users, teaching experts, and writing experts," the project highlights the power of keeping "humans in the loop" when designing edtech tools.

166 https://www.writingresearch.net/
167 https://ies.ed.gov/funding/grantsearch/details.asp?ID=4633

Leveraging Math Badges for Mastery-Based Assessment

The Idaho Math Initiative, led by the State Department of Education (SDE) and funded by Idaho Statute 33-1627, seeks to promote the improvement of mathematical instruction and student achievement in the state while leveraging digital badges to mark student competency. One of four states, along with Illinois, Rhode Island, and Kentucky, Idaho worked with XQ Institute to pilot using Math Badges designed for high school mathematics to implement a mastery-based assessment system. XQ support included the creation of Math Badge assessments and funding a half-time Regional Math Specialist to serve as project lead. The project also provided funding for professional training across eight school districts and planning time for school-level teams. The SDE is also working with the Idaho Division of Career and Technical Education (CTE) to develop a system to track and store student progress and digital badges. The project will allow CTE programs to integrate course content with mathematics assessments and provide an assessment system for awarding mathematics course credit.

Students earn badges by providing evidence demonstrating mastery of the badge content and practicing expectations in a multiple measures system. The badges will align with three standard general education mathematics courses available through Idaho's colleges and universities.

Developing a Graduate Profile and a Graduate Profile Learning Continuum

The Howard-Suamico School District (HSSD) near Green Bay, Wisconsin, has eight schools and serves more than 6,000 students in grades PK-12. The district developed a Graduate Profile to prepare students for a constantly evolving world. The Graduate Profile characteristics include being a self-starter, critical thinker, collaborator, communicator, being adaptable, responsible, and solutionist. Students learn foundational academic skills alongside the graduate profile characteristics to accentuate a whole-student experience in HSSD. Throughout the year, the Board of Education monitors student performance in the seven characteristics of the Graduate Profile.

To help ensure students build these skills at developmentally appropriate levels throughout their PK12 career, the district also developed a Graduate Profile Learning Continuum that explains the progression of learning throughout the Graduate Profile. This continuum guides student learning experiences from PK-12. Edtech is used as needed to help students develop these skills. The goal is to prepare students for success in whatever post-graduation path they choose.

Appendix B - Additional Digital Design Divide Examples

The examples below showcase additional states and school districts working to close the Digital Design Divide.

Maine Project Benefits from Contributions at all Levels

The COVID-19 pandemic highlighted and exacerbated systemic inequities and challenges related to ensuring equitable learning opportunities for all Maine learners and particularly for rural students, students with individualized education plans, and economically underserved students. To address these inequities, the Maine Department of Education (MDOE) Commissioner's Office, through the Rethinking Responsive Education Ventures (RREV) grant,[168] is providing professional development training and funding to support innovative remote learning solutions that have the potential to improve learner outcomes. As a result of this five-year grant, the Institute of Education Sciences Regional Educational Laboratory (REL) Northeast & Islands[169] will collaborate with MDOE and other partners, including students, to build district capacity to use research and data to improve innovations developed through the RREV grant and other sources, assess learner outcomes, and develop promising practices for sustaining and scaling up the innovations.

REL Northeast & Islands will facilitate a training series with district innovation teams to develop and implement a process for examining the implementation fidelity of their remote learning innovations, create a fact sheet summarizing the literature on the innovation areas such as outdoor education and online learning, and produce a co-authored blog series.

By leveraging federal resources, state-level systems, and local understanding of context and needs, this program aims to better ensure rural Maine educators are able to meet the needs of all learners in innovative ways.

South Carolina Instruction Hub Provides Statewide Access to Digital Learning Resources

Serving more than 780,000 students in 75 Districts, the South Carolina Department of Education (SCDE) needed to address the problem of uneven distribution of learning resources across the state. The SCDE sought to create and provide each school equitable access to up-to-date digital courses and materials, so they partnered with a digital education content provider to develop a Learning Object Repository (LOR). A LOR is a searchable digital library of educational content (learning objects) where teachers, students, and administrators can store, search, access, and share various digital resources from any device and place. The SCDE uses the LOR, called the Instruction Hub, to manage resources and assimilate new content for automated distribution to every school district in the state. Because the LOR utilizes industry-accepted data standards, it integrates with various Learning Management Systems used by South Carolina school systems. In addition to increasing the number of high-quality digital resources available to teachers, the LOR saves teachers valuable planning and preparation time.

168 (n.d.). Rethinking Responsive Education Ventures - RREV. Maine Department of Education. Retrieved September 6, 2023, from https://www.maine.gov/doe/rrev

169 U.S. Department of Education (n.d.). Regional Educational Laboratory Northeast and Islands. Institute of Education Sciences. Retrieved September 6, 2023, from https://ies.ed.gov/ncee/rel/region/northeast

The Instruction Hub is implemented across 99 percent of the state's schools. A robust meta-tagging system makes finding content by grade, subject, and keywords easy. Through Instruction Hub, educators can access licensed resources from several content providers and South Carolina Educational Television.

Arkansas Builds Partnership for Equity in Digital Professional Learning Access

Often focused on expanding student opportunities, public-private partnerships hold significant potential for educator learning as well. Tapping into this potential is the aim of ArkansasIDEAS, "a partnership between Arkansas PBS and the Arkansas Department of Education Division of Elementary and Secondary Education.

In a state with a majority-rural population, ArkansasIDEAS provides access to more than 700 online professional development courses free of charge to all Arkansas licensed educators. This equity of access for educators across the state also ensures all districts are able to provide professional learning for their teachers in accordance with state law in areas such as Holocaust education, the science of reading, state history, and others. While the full catalog is available for licensed Arkansas educators, ArkansasIDEAS also provides access to a limited selection of courses for paraprofessionals, pre-licensed educators, and support staff. By including all licensed educators and allowing an on-ramp for pre-licensed teachers, ArkansasIDEAS is ensuring the state's educators and future educators have equitable high-quality digital resources for professional learning.

Sparking Innovation in Response to Teacher Needs

Sometimes, innovation requires a push. A program supporting teachers across West Virginia works to do just that. The West Virginia Public Education Collaborative (WVPEC) housed at West Virginia University, is a "non-partisan collaborative of diverse state and national leaders committed to championing public education at all levels through outreach and innovation while engaging government, education and business leaders to rapidly respond to emerging issues." Among WVPEC's goals is a resolve to elevate and expanding existing initiatives. Its Teacher Innovation Mini-Grant program does just that. From 198 applications requiring teachers to explain how their project would "address post-COVID-19 learning, and how will these classroom enhancements become permanent classroom innovations," WVPEC announced 23 projects for Summer 2023. In partnership with the Claude Worthington Benedum Foundation, WVPEC was able to award $4,000 in funding to each recipient. Projects span pre-k through 12th grade and fall within the categories of career and technical education, ELA, STEAM, Special Education, and Family Engagement. As a result of WVPEC's efforts to listen to and better understand what teachers need in order to innovate, the program is set to spark teacher-led innovation across the state.

Louisiana Teachers Create State-Specific Edtech Integration Guide

When considering how best to support Louisiana educators with edtech integration, the Louisiana Department of Education (LDOE) found that much of the professional learning provided by outside groups was challenging to implement and integrate because it didn't align with the state-approved curriculum. Recognizing the need for state-specific support, they assembled a geographically diverse team of teachers, coaches, leaders, and librarians across the state to develop digital learning guidance to support technology integration within the state curriculum and aligned with the state Educational Technology Plan and Digital Literacy Guidance.

The LDOE created a website with educator-created content for teachers and edtech leaders to communicate this information. Because Louisiana educators develop the content, it is relevant to the specific state context. Additional content integration materials are under development. The LDOE hosts monthly calls for edtech leaders and posts the slide decks online for reference. Department leaders recommend that states facing similar challenges budget for these kinds of projects and tap into and amplify the voices of in-state talent.

Personalizing Student Learning Through Tacoma Online

Tacoma Online, an online school founded in 2021 in response to the COVID-19 pandemic, has evolved into an integral part of Tacoma Public Schools' innovative learning landscape. Catering to more than 1,200 students from K-12, it provides a personalized online learning experience and remains committed to bridging educational gaps exacerbated by the digital divide. Tacoma Online provides flexible and accessible learning opportunities that cater to individual student needs anytime and anywhere.

Tangible outcomes of the program's effectiveness include increased credit attainment, improved attendance rates, elevated academic achievements, and prioritized student engagement levels. These successes are quantified through the school's PACE program (Personalized, Accelerated, Connected, Empowered), capturing both quantitative metrics and qualitative feedback. Each student has a PACE Coach, a caring adult staff member committed to supporting each student's social, emotional, and academic growth.

The initiative's success is evident in its enhanced offerings, including optional in-person learning experiences that enrich the educational journey. These advancements pave the way for expansion beyond the immediate region, reaching students across the wider area. The program is expanding to include Tacoma Flex, the part-time enrollment of secondary learners choosing to engage in in-person and online learning.

According to Adam Kulaas, Director of Innovative Learning & CTE for Tacoma Online, forging robust partnerships with community organizations and technology providers laid a solid foundation for the program's success. In addition, Tacoma Online provides tailored support for students and educators transitioning to online learning. Consistent data collection and analysis of student performance and engagement continue to drive ongoing program refinements and support sustained growth and efficacy.

Appendix C - Additional Digital Access Divide Examples

The examples below showcase additional states and school districts working to close the Digital Access Divide.

Broadband Availability Data Collection and Mapping at Navajo Preparatory School

The Navajo Preparatory School in New Mexico serves learners across the Navajo Nation, which is the size of West Virginia. The school enrolls approximately 270 students from more than 50 majority-rural communities. At the start of the COVID-19 pandemic, the school surveyed learners to understand internet access availability in specific residential locations down to their global positioning system coordinates (latitude and longitude). Many learners needed access to reliable, high-speed broadband. Based on the survey results, the school created a map identifying which ISPs and cellular services had service available. Their school staff installed the necessary equipment in students' homes, including extending cellular coverage by installing routers and antennas. The school installed HughesNet satellite technology for learners who could not be reached by wired or cellular service. In some cases, the school distributed multiple hotspots to individual households. They are maintaining the home internet options for all learners in case the school needs to transition online again, ensuring that learners have reliable, high-speed broadband for learning at home.

Guam Receives Internet for All Planning Grant

Guam has consistently lagged behind all other United States territories regarding internet speed growth.[170] Approximately 30 percent of the state population lives where high-speed internet is unavailable,[171] including some of the 31,000 students representing diverse ethnic groups who attend Guam's 36 public schools. In areas where high-speed internet is available, Guam residents pay significantly higher rates than on the United States mainland.[172] Speak Up Survey results from Project Tomorrow have indicated that there is a digital divide that exists within Guam's public schools and a gap between Guam's public schools and United States mainland schools in terms of access to and usage of digital technologies.[173] To help address this challenge, Guam received planning grants for deploying high-speed Internet service networks and developing digital skills training programs under the Biden-Harris Administration's "Internet for All" initiative. Guam is receiving $1.4 million in funding from the Bipartisan Infrastructure Law to plan, deploy, and adopt affordable, equitable, and reliable high-speed Internet service throughout the territory. The funding will create new opportunities to expand people's access to high-speed Internet, digital literacy, and IT job training in Guam.[174]

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170 (2023, July 11). The Pulse of Pacific Broadband: Taking a Deeper Dive. Pacific Broadband and Digital Equity. Retrieved September 6, 2023, from https://www.pacificbroadband.org/2023/07/11/the-pulse-of-pacific-broadband-taking-a-deeper-dive/

171 (n.d.). Guam. Internet For All. Retrieved September 6, 2023, from https://www.internetforall.gov/interactive-map/Guam-GU

172 U.S. Department of Education (n.d.). Broadband Affordability Tracker. Pacific Broadband and Digital Equity. Retrieved September 6, 2023, from https://www.pacificbroadband.org/resources/#tracker

173 Velasco, Richard. (2017). Hearing Pacific Island Voices: Digital Divide in Guam's Public Schools. 1. 25-40.

174 (2023, May 16). Biden-Harris Administration Awards $1.4 Million to Guam in 'Internet for All' Planning Grants. National Telecommunications and Information Administration. Retrieved September 6, 2023, from https://www.ntia.gov/press-release/2023/biden-harris-administration-awards-14-million-guam-internet-all-planning-grants

Virginia Implements Statewide Collection of Student Home Broadband Access

During the COVID-19 pandemic, Virginia needed a complete picture of student home access to devices and broadband. The state couldn't apply resources to address the problem without an accurate understanding of student access. In 2022, Virginia passed legislation requiring every school district to submit an annual report to the Virginia Department of Education and the Virginia Department of Housing and Community Development listing the 911 address of all students who do not have home broadband access, defined by speeds at or above 100 megabits per second (Mbps) download and 20 Mbps upload.

Data collection processes can be challenging to establish, and school districts had to devise methods of collecting accurate information from families. In addition, the data includes PII such as student addresses and must be secured. Data collection is more efficient now that systems have been established to gather and protect it. Student information systems must include standardized fields to store the data without requiring districts to make costly custom requests.

By systematically collecting device and access metrics across Virginia, the state has a comprehensive data set for broadband planning. At the local level, districts can understand better how to serve their students and families.

Texas District Partners with SpaceX to Bring Satellite Internet to Underserved Communities

Ector County Independent School District (ECISD) serves about 33,500 students in Western Texas, with approximately 80 percent of students identifying as Hispanic or Latino. When the pandemic interrupted in-person schooling in 2020, surveys indicated that 39 percent of ECISD students either did not have home internet access or had marginal internet access that was inadequate for schoolwork. Looking to find a long-term solution for families in communities where reliable high-speed broadband was unavailable, Ector County ISD became the first school district to partner with SpaceX, the Starlink satellite internet service provider, for broadband.

The district targeted homes in the Pleasant Farms area, a rural community with no high-speed internet options for the initial rollout. Philanthropic partners supporting the initiative included Chiefs for Change, Permian Strategic Partnership (a regional coalition of oil and gas industry leaders), and the Odessa Development Corporation. Challenges included assisting residents with equipment setup and helping some families understand the need for and benefits of home broadband. District personnel made home visits and phone calls to gather feedback about the project.

The work resulted in more than 1,000 families being connected to reliable, affordable internet service. The Ector County partnerships demonstrate how school and government agencies can collaborate to document local broadband needs and identify funding opportunities.

Bringing Broadband to Tribal Lands in Minnesota

The Bois Forte Band of Chippewa Indians, also called Ojibwe, live in northern Minnesota, about 45 miles from the Canadian border. The reservation spans Koochiching, St. Louis, and Itasca Counties. Through the Tribal Broadband Connectivity Program, the tribe received a $19,800,704 Broadband Infrastructure Deployment grant to install fiber directly connecting approximately 2,050 unserved Native American households, plus more than 60 businesses and community anchor institutions, with up to 1 gigabyte per second fiber broadband service. The program's goals include increasing healthcare access, boosting employment and economic development, building telework and entrepreneurship opportunities, providing training and workforce development, and improving the overall quality of life of Tribal residents. Beneficiaries will include Tribal residents, students, educators, adult learners, job seekers, entrepreneurs, employers, and employees, including the employees of Tribal operations.

Massachusetts District Takes a Continuous Improvement Approach to Data Privacy and Security

Protecting student data privacy is an ongoing, ever-evolving challenge. Navigating rapid changes in risk while simultaneously sustaining the appropriate support and continuing to grow a security and privacy-focused district culture is an ongoing challenge. Dedham Public Schools in Massachusetts is tackling these challenges with a growth mindset and continuous improvement approach that began by completing a district-wide self-assessment.

The assessment "provided an excellent opportunity to reflect, prioritize and improve many of our current practices, especially around the need to have a sustained, focused approach to student data privacy and cybersecurity," said District Technology Director Dr. Don Langenhorst. "Not only were we able to adapt and adopt new approaches, but we also discovered a solid network of colleagues around the country who are willing to collaborate and share effective practices for school communities."

At the administrative level, student data privacy topics and ongoing improvement are a component of every bi-monthly meeting. The district established a CyberSecurity Team, which meets monthly to review projects and future needs or goals. They also made data privacy and cybersecurity part of the quarterly professional development plan for all educators and staff. This includes conducting differentiated, AI-based phishing tests quarterly along with quarterly training.

"The biggest indicator of success has been seeing changes in behavior with a significant increase in staff awareness, commitment, and acceptance of practices," Langenhorst said.

Nassau BOCES Supports School System Privacy and Cybersecurity Efforts

The Board of Cooperative Educational Services of Nassau County (Nassau BOCES) is the largest in New York State, serving 56 school systems. Among the many resources available to members is their Data Privacy and Security Service (DPSS), which provides guidance and resources to help districts comply with federal and state student data privacy laws. The service works with districts to improve their cybersecurity posture through the application of the National Institute of Standards and Technology Cybersecurity Framework, working primarily with district-appointed Data Protection Officers (DPOs) and Directors of Technology.

The DPSS mostly focuses on district compliance under New York State Education Law 2-d, a law enacted to protect the PII of students from unauthorized disclosure. The BOCES provides school systems with training and resources to help them avoid accidental data disclosures and cyberattacks, as well as consultation and assistance related to disclosures and other cyber events. Currently, 92 percent of Nassau BOCES members subscribe to the DPSS service and are continuously working to improve their data privacy and security posture.

The BOCES also offers a Data Protection Officer Support Service as an additional member resource. Because the majority of district DPOs have multiple roles and responsibilities, this service provides additional support to comply with state regulations. These services help ensure the security of student data in even the smallest school systems.

Washington, D.C. Provides Access Improving Accessibility

With the announcement of the Community Internet Program, Washington, D.C. granted ISPs "free access to the roofs of DC-owned buildings, operated by the Department of General Services, to install service antennas if they commit to providing resident connectivity with reliable, high-speed connections (200 Mbps up/200 Mbps down or higher) at reduced or no cost to households eligible for the federal Affordable Connectivity Program." While the move provides greater internet connectivity to all DC residents, it has specific implications for DC students requiring internet access to complete school-assigned activities at home.

The move is also likely to aid DC Public School (DCPS) officials as they work to realize the goals set forth by the "DCPS Digital Equity Act of 2022," which calls on district officials to ensure all DCPS students have "sufficient internet access to support in-school and out-of-school learning." The Act also requires DCPS's Comprehensive Student Technology Equity Plan to articulate the digital literacy skills necessary to support their learning - an example of access and digital health, safety, & citizenship planning happening concurrently to close the digital access divide.

Digital Divides

The National Educational Technology Plan (NETP) is the flagship edtech policy document for the United States. It articulates a vision of equity that calls upon all involved in American education to ensure every student has access to transformational learning experiences enabled by technology. State leaders in state departments of education, governors' offices and legislatures play a critical role in achieving this vision. This guide provides these leaders some immediate steps they can take to support the communities and students they serve to advance the goals of the NETP.

As a starting point, every state should have a vision for digital learning. This could take the form of a digital learning plan or a portrait of a learning environment, but most importantly, the vision should address critical questions relating to the three digital divides:

Digital Use (active student creation and critical analysis):

- Does the state provide resources, including funding, to enable districts to provide training to teachers on the integration of edtech into effective instruction?
- Is your state collecting information from districts that can help determine if edtech is being used effectively?

Digital Design (universal design for learning; teacher time and capacity):

- Has your state adopted the Universal Design for Learning Framework?
- Does your state have a Profile of a Teacher that incorporates the integration of technology into effective student learning experiences?

Digital Access (connectivity, devices, content, accessibility, digital health, safety, & citizenship):

- Has the state communicated expectations around accessibility for students in school and at home?
- Does the state have a plan for supporting student digital health, safety, and citizenship?
- Does the state have a sustainability plan?

The following are some immediate, high impact steps state policymakers can take in their states to advance the equitable and effective use of edtech in their states.

1. Establish a cabinet level edtech director to ensure education technology funds are spent wisely and effectively.
2. Develop a digital equity plan in consultation with a broad group of stakeholders and according to established review cycles.
3. Develop and publish a "Portrait of a Learning Environment" to present a vision for the effective and appropriate use of edtech while setting expectations around habits and abilities no matter what the space.

State leaders are encouraged to read the full report for more recommendations and examples of states, districts and schools that are using technology effectively to drive outcomes for learners.

Digital Divides

The National Educational Technology Plan (NETP) is the flagship edtech policy document for the United States articulating a vision of equity that calls upon all involved in American education to ensure every student has access to transformational learning experiences enabled by technology. This guide provides district leaders—including superintendents and school board members—some immediate steps they can take to support the communities and students they serve to advance the goals of the NETP.

As a starting point, every district should have a vision for student success—such as a profile of a learner or graduate—and a profile of an educator that aligns with that vision. In designing strategies to achieve this vision, district leaders should address critical questions relating to the three digital divides:

Digital Use (active student creation and critical analysis):

- Does your district provide professional development and support to district and building-level administrators and educators to support the use of evidence to inform edtech decisions?
- Does your district's subject matter curricula scope and sequence ensure that student learning experiences build age-appropriate digital literacy skills through active technology use for learning?
- Is your district collecting data to determine if teachers and students are using technology effectively?

Digital Design (universal design for learning; teacher time and capacity):

- Has your district adopted the Universal Design for Learning Framework?
- Has your district built in adequate time for teachers to learn about, and practice, the effective incorporation of technology into instruction?

Digital Access (connectivity, devices, content, accessibility, digital health, safety, & citizenship):

- Has your district communicated consistent expectations regarding the use of technology in all classrooms and settings?
- Does your district's budget account for long term sustainability of edtech investments?
- Do your district's procurement processes take into account accessibility and inclusivity of edtech tools?

The following are some immediate, high impact steps district leaders can take to advance the equitable and effective use of edtech in their classrooms.

1. Establish a cabinet level edtech director to oversee and support the equitable and effective use of technology across the district.
2. Develop a digital equity plan in consultation with a broad group of stakeholders and according to established review cycles.
3. Develop and publish a "Portrait of a Learning Environment" to present a vision for the effective and appropriate use of edtech while setting expectations around habits and abilities no matter what the space.

District leaders are encouraged to read the full report for more recommendations and examples of states, districts and schools that are using technology effectively to drive outcomes for learners.

Digital Divides

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As a starting point, every school leader needs to communicate a vision for student learning that incorporates the appropriate use of technology in every classroom. That vision should address critical questions relating to the three digital divides:

Digital Use (active student creation and critical analysis):

- Does your school provide feedback mechanisms that empower students to become co-designers of their learning experiences?
- Does your school utilize rubrics for effective digital resource and tool adoption that support the Universal Design for Learning (UDL) principles?

Digital Design (universal design for learning; teacher time and capacity):

- Has your school provided time, resources, and support for educators to enhance and grow their professional practice, develop digital literacy skills, and design learning experiences that align with the UDL Framework?
- Does your school solicit feedback from diverse stakeholders to collaborate on decision-making for technology purchases, learning space design, and curriculum planning?

Digital Access (connectivity, devices, content, accessibility, digital health, safety, & citizenship):

- Does your school conduct regular needs assessments to ensure technology properly supports learning?
- Does every student in your school have access to "everywhere, all-the-time learning"?

The following are some immediate, high impact steps school leaders can take to advance the equitable and effective use of edtech in their classrooms.

1. Identify an edtech leader in your school who can support educators, conduct needs assessments and develop feedback mechanisms that include a diverse set of stakeholders including students.
2. Develop a digital equity plan in consultation with a broad group of stakeholders and according to established review cycles.
3. Ensure all teachers have the time and support necessary to build capacity as learning designers.

School leaders are encouraged to read the full report for more recommendations and examples of states, districts and schools that are using technology effectively to drive outcomes for learners.

Digital Divides

The National Educational Technology Plan (NETP) is the flagship edtech policy document for the United States articulating a vision of equity that calls upon all involved in American education to ensure every student has access to transformational learning experiences enabled by technology. As the individuals entrusted with educating the students in their classrooms, educators play a critical role in achieving this vision, but may not feel empowered to drive system-level change. This guide provides teachers with some practical steps they can take to support their peers and the communities and students they serve to advance the goals of the NETP.

As a starting point, every educator should use the NETP to evaluate their own practice by reflecting on critical questions relating to the three digital divides:

Digital Use (active student creation and critical analysis):

- Are all the students I serve having transformative, active, creative, critically thoughtful experiences supported by technology?
- Am I actively empowering students to become co-designers of their learning experiences?

Digital Design (universal design for learning; teacher time and capacity):

- Am I developing my digital literacy skills and am I modeling those skills for the students I serve?
- Am I taking advantage of opportunities to grow and enhance my professional practice?
- Am I designing learning opportunities and experiences that align with the Universal Design for Learning principles?

Digital Access (connectivity, devices, content, accessibility, digital health, safety, & citizenship):

- Does every student in my classroom have equitable access to the learning experiences I design?
- Have I ensured that every student in my classroom can access the edtech tools we use?

The following are some immediate, high impact steps educators can take to advance the goals of the NETP and improve the equitable and effective use of edtech in their communities.

1. Establish professional learning networks and communities with your peers on topics in the NETP.
2. Advocate directly or through your member organizations for the conditions necessary to support the effective use of technology in your classroom and community.
3. Inspire your peers and leaders with examples of incredible work taking place in other schools across the country.
4. Adopt the UDL Framework in your school.

Educators are encouraged to read the full report for more recommendations and examples of states, districts and schools that are using technology effectively to drive outcomes for learners.

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