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SETDA
LEADERSHIP • TECHNOLOGY • INNOVATION • LEARNING

The Universal Connectivity Imperative

Sustaining Progress to Close the Digital Access Divide in K–12 Education

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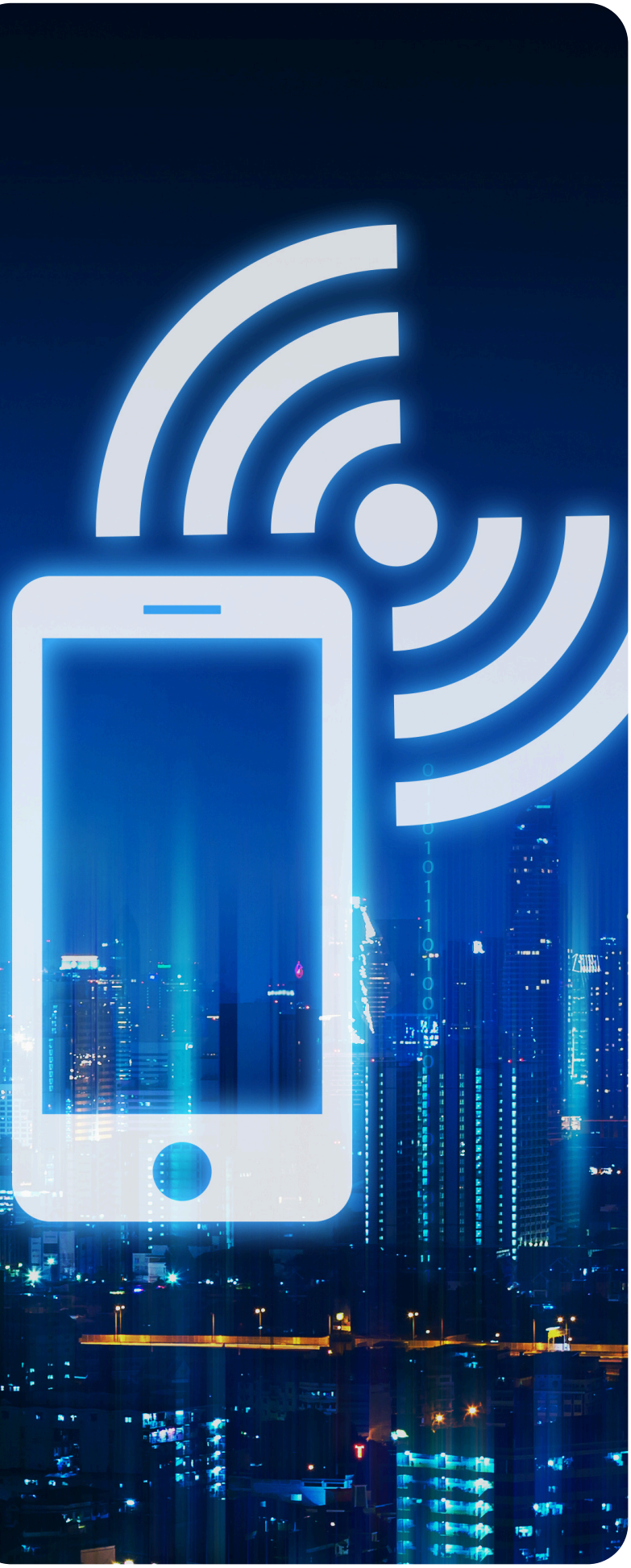


The Universal Connectivity Imperative (UCI) builds upon the groundbreaking research and insights of SETDA's previous reports, including "The Broadband Imperative III: Driving Connectivity, Access and Student Success" and "2024 State EdTech Trends." UCI provides a comprehensive analysis of the current K–12 digital access divide, as articulated in the U.S. Department of Education's 2024 National Educational Technology Plan; explores the progress made thus far; and identifies emerging challenges that demand our attention. Through this report, we aim to present a road map for policymakers and education leaders, offering evidence-based strategies and best practices to continue bridging the digital access divide and ensure all learners have equitable, universal access to internet connectivity.

About SETDA

Founded by state education agency leaders in 2001, SETDA is the principal nonprofit membership association representing U.S. state and territorial educational technology and digital learning leaders. For over 20 years, SETDA has provided well-established forums for advocacy on policy and practice, professional learning, interstate collaboration, and public-private partnerships centered around digital learning and equity. SETDA members are known for leading the charge within their state education agencies for proper uses of technology in schools, including supporting district leaders and their state colleagues in federal education programs, assessment, curriculum, and data collection.

I. Introduction: Why K–12 Universal Connectivity?

Due to rapid changes in the digital landscape, the first decade of the new millennium paved the path for technology-enabled teaching and learning. In response, SETDA produced a series of reports that advocated for significant infrastructure improvements to and through schools at scale so that K–12 students could also reap the benefits of the global technological transformation. Titled "The Broadband Imperative," three reports published in 2012, 2016, and 2019 called for national per-student bandwidth targets in schools, federal and state funding to support this aim, and a shared vision to guide investments.

Tangible impact followed "The Broadband Imperative" and similar advocacy. Under former President Barack Obama's ConnectED Initiative, the federal government launched a coordinated multi-agency effort to connect K–12 schools to broadband. In 2014, the Federal Communications Commission (FCC) adopted SETDA's per-student bandwidth targets, while beginning in 2015, district superintendents and state governors pledged to prioritize closing the digital access divide in education.

The momentum from such efforts continues to this day, with 74 percent of districts now providing internet access to schools at 1 megabit per second (Mbps) per student, compared to 8 percent in 2015. Moreover, 85 percent of state education agencies indicate that they have taken steps over the past year to improve broadband and device access.

However, the COVID-19 pandemic entirely reshaped the national conversation in K–12 from one strictly focused on at-school connectivity to one that considers "universal connectivity," even outside of school grounds, as a required component of a modern education system. Federal data continues to reveal that many American households, especially those with Black, Hispanic, or Indigenous students and those who reside in rural areas, lack an internet subscription or device access at home. Families with K–12 students that have limited incomes are also "subscription vulnerable," finding it difficult to maintain a connection month to month at home.

The universal connectivity conversation has also encompassed critical dimensions of digital inclusion that lie outside of internet and device access. The current national discourse around online health and safety and artificial intelligence (AI) literacy requires sufficient support for digital skill building.

The increase in device take-home policies — paired with the fact that local educational technology leaders cite cybersecurity as a top challenge—calls for on-demand technical support. Finally, the recent rule from the U.S. Department of Justice (DOJ) to strengthen web and mobile accessibility renews attention to ensuring inclusive digital learning tools and platforms.

Therefore, reenvisioned as the Universal Connectivity Imperative, this report aims to:

- Highlight the long-term benefits of universal connectivity.
- Synthesize the latest data and trends since Broadband Imperative III.
- Highlight promising strategies that support K–12 students and families.
- Recommend actions that federal policymakers and state K–12 education leaders can take to sustain progress made over the past several years.

Research continues to suggest that K–12 students are more likely to achieve greater success and well-being when they are connected off-campus. These benefits can be ascribed to the fact that closing the digital access divide connects them and their families and caregivers to opportunities that are otherwise difficult to attain.

Benefits of K–12 Universal Connectivity

Academic Achievement

Students impacted by the digital access divide exhibit GPAs approximately 0.4 points lower than peers, or an average of seven to 14 months of learning loss. Studies have also suggested that an additional 232,000 high school students on the wrong side of the divide are more likely to drop out. This phenomenon could be due to factors such as a lack of digital skills and barriers to accessing educational materials from home.

For instance, while online, high-dosage tutoring can be an effective method to accelerate learning, these supports would only be available on campus for students without internet or device access from home.

Economic Impact

Lower academic achievement due to the digital access divide is associated with 4 percent to 6 percent lower annual income. When taking into account all disconnected students (15 million to 16 million nationally), the digital access divide leads to an annual gross domestic product (GDP) loss of $22 billion to $33 billion, with additional public costs stemming from higher health care usage and lower taxable incomes.

Additionally, while 92 percent of jobs require digital skills, one-third of workers lack those skills due to underinvestment in this area and structural inequities. Workers who qualify for jobs that require even one digital skill can earn an average of 23 percent more than they can in a job requiring no digital skills.

Physical and Mental Health

Universal connectivity increases the availability of public health information, and this contributed to lower rates of COVID-19-related mortality in communities with better broadband access.

Research also indicates that connectivity rates are correlated with increases in the use of telehealth services, and schools are already beginning to explore on-site telehealth services. Furthermore, many young people currently turn to online resources for their behavioral health needs. Black, Latino, and LGBTQ+ groups—who face greater cultural, social, and economic barriers to in-person care—are more likely to access virtual mental health resources.

Role of Policy in Advancing K–12 Universal Connectivity

Recognizing these issues, the U.S. Congress responded with a package of legislation in recent years, including the Coronavirus Aid, Relief, and Economic Security (CARES) Act, Coronavirus Response and Relief Supplemental Appropriations (CRRSA) Act, American Rescue Plan Act, and Infrastructure Investment and Jobs Act. Nearly $65 billion that policymakers authorized and appropriated has been invested into new broadband deployment, affordability, adoption, and skill-building projects. Congress also focused support on ensuring that educational and health services could be delivered to homes. The goals of such policies supporting universal connectivity include:

Expanding Broadband Networks

Through CARES and the American Rescue Plan, Congress has empowered states, counties, and municipalities to invest billions of dollars for local economic recovery. For example, the $10 billion Capital Projects Fund (CPF), administered through the U.S. Department of the Treasury, is helping states, territories, and tribal governments carry out critical capital projects designed to enable work, education, and health monitoring, including remote options. Many entities used CPF for broadband network deployment.

The largest-ever federal investment in broadband deployment came through the Infrastructure Investment and Jobs Act, which established the $42 billion Broadband Equity, Access, and Deployment (BEAD) Program, administered through the National Telecommunications and Information Administration (NTIA). BEAD prioritizes locations currently not connected to certain bandwidth thresholds. Furthermore, NTIA has funded nearly $1 billion through its Enabling Middle Mile Broadband Infrastructure Program, connecting local networks to the internet backbone.

Prioritizing Broadband Adoption

Congress established three digital equity programs totaling $2.75 billion: the State Digital Equity Planning Grant Program, the State Digital Equity Capacity Grant Program, and the Digital Equity Competitive Grant Program. These programs aim to ensure that everyone has the skills, technology, and capacity to reap the full benefits of the digital economy.

Making Service Affordable

Congress allocated $3.2 billion toward a temporary program at the FCC called the Emergency Broadband Benefit (EBB). The program supplied a $50 monthly discount ($75/month for those living on tribal lands) to qualifying households to help them afford broadband service and a one-time subsidy of up to $100 for a low-cost device. In the Infrastructure Investment and Jobs Act, Congress built on EBB, renaming it the Affordable Connectivity Program and adding $14.2 billion to the program. Over 23 million qualifying households received up to a $30/month discount through this update.

Ensuring Anywhere, Anytime Learning

The Elementary and Secondary School Emergency Relief (ESSER) fund—which was part of CARES, CRRSA, and the American Rescue Plan—made available nearly $200 billion via formula to states and districts for COVID-19 response activities, including purchasing educational technology to support online learning.

An estimated 92 percent of districts used ESSER toward this end, and initial data points to the positive impact of the funds on academy recovery. Additionally, the American Rescue Plan created the Emergency Connectivity Fund, appropriating over $7 billion through the FCC to reimburse schools and libraries that provide free broadband service and connected devices to students and patrons. Through CRRSA, Congress further appropriated $285 million through the Connecting Minority Communities Pilot Program to support 93 historically Black colleges and universities, tribal colleges and universities, and minority-serving institutions in expanding broadband capacity and use, both on campus and in the surrounding community.

Leveraging Telehealth Services

Telemedicine was underused and understudied until the COVID-19 pandemic, during which reduced regulations and increased payment parity facilitated a rapid increase in telemedicine consultation. In CARES, Congress relaxed guidelines for Medicare coverage and allowed for connected health at federally qualified health centers, rural health clinics, and hospices. The law also allocated billions of dollars to support telehealth programs through the U.S. Department of Health and Human Services, the U.S. Department of Veterans Affairs, the U.S. Department of the Interior, the U.S. Department of Agriculture, and the FCC.

Charting the Path Forward

Through these efforts, policymakers recognize that the path to universal connectivity must be about more than just infrastructure. The mission now is to connect every American to a whole new generation of opportunity, allowing all individuals, families, and communities to work, learn, and connect to various services. Failing to prioritize this issue carries a high societal cost, because it harms opportunities for economic success, educational achievement, positive health outcomes, social inclusion, and civic engagement. The remainder of this report —informed by input from federal, state, and local government leaders; researchers; nonprofit organizations; industry representatives; and K–12 students and teachers—provides:

- An examination of the progress the U.S. has made on various elements of digital inclusion as well as remaining concerns that the nation needs to address.
- Promising strategies to close persistent gaps, curated by SETDA's Universal Connectivity Imperative Working Group.
- A framework of public policies necessary to maintain momentum and support practitioners implementing solutions.

II. The Vision: National Educational Technology Plan

In March 2020, the world abruptly stopped. Classrooms became silent, businesses shut down, and life as we knew it would never be the same. For K–12 students everywhere, the COVID-19 pandemic changed how, where, and with whom they learned. Homes and various public settings became classrooms, and the internet became students' lifeline not only to school but also to overall access to opportunity.

In April 2020, the U.S. Census Bureau created a survey to assess the impact of the COVID-19 pandemic, measuring internet and computer access through the Household Pulse Survey (HPS). The findings from the September 2020 HPS show that in 52 million households with children present, 8 percent, or 4.4 million households, had a computer available sometimes, rarely, or never. In households where a computer was always available, 60 percent received devices from the child's school or school district. The numbers were similar for internet access. Seven percent, accounting for 3.7 million households, had internet available sometimes, rarely, or never. In households where the internet was always available, 2.4 percent received access from the child's school or school district.

Additional data and media stories indicated that students from limited income, rural, or minority households faced more significant connectivity challenges compared to peers. While efforts to expand access have accelerated since then, including federal and state initiatives to fund broadband infrastructure, the road to recovery will be long and difficult for students who fell behind during the pandemic.

Ultimately, the story of March 2020 became a national call to action. It was a moment when society realized that continuous access to reliable, affordable internet was no longer a luxury but a necessity—essential for education, work, and the future of every student. COVID-19, therefore, provided the urgency for the U.S. Department of Education to refresh the National Educational Technology Plan (NETP), the federal government's flagship edtech policy document that provides a vision for transformative possibilities in K–12 education.

The 2024 NETP illustrates a future where universal connectivity is fully realized, setting the conditions necessary for all students to engage in technology-empowered learning experiences. Imagine a student living in rural America joining a science lab from thousands of miles away, collaborating with peers across the globe, or a teacher using real-time data to customize and personalize instruction.

Picture a student with disabilities using accessible virtual reality tools connected to the web to explore their interests and passions. The NETP further highlights the reality that merely having access to technology is not enough. Leaders must bridge all three critical aspects of the digital divide, including access, use, and design.

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 do not."* — ***2024 NETP***

The 2024 NETP stresses the importance of active learning enabled through technology, where students engage instructional materials with agency rather than passively consuming information from a screen. For example, students might leverage interactive simulations, engage in hands-on experiments, or participate in online discussions, leading to deeper understanding and retention of content. Research shows that this active engagement enhances educational outcomes compared to traditional methods.

To bridge the digital use divide, NETP recommends clearly outlining the skills and competencies expected of all K–12 graduates. Often referred to as the portrait of a learner/graduate, this framework can help create learning experiences characterized by active technology use, thereby fostering students' growth as collaborative, creative, and adaptable individuals. As demonstrated by the Nevada Department of Education, a multi-sector effort in developing a portrait of a learner/graduate is essential to create a collaborative ecosystem with a shared goal for student success.

At a local level, Northern Cass School District 97 in North Dakota engaged in a complete district redesign driven by its portrait of a learner. For example, students might use technology to research local issues and present findings to the community, gaining critical skills outlined in the portrait of a learner, such as critical thinking, creativity, and problem-solving, all the while making a tangible impact.

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."* — ***2024 NETP***

The 2024 NETP underscores the necessity of building educators' capacities to design and implement learning experiences characterized by active technology use. In particular, the U.S. Department of Education advocates for reinforcing knowledge of the Universal Design for Learning (UDL) principles.

At a local level, the Bartholomew Consolidated School Corporation in Indiana provides educators with ample time and resources to collaboratively design inclusive learning environments by using UDL as a foundation. At the state level, the Learning Technology Center in Illinois supports cost-effective educator capacity-building efforts by collaborating with districts to identify instructional technology coaching needs and deploy necessary personnel.

The increasing number of digital tools and platforms available to educators post-pandemic, including many powered by AI, poses another challenge in closing the digital design divide. More than 65 percent of companies report using generative AI tools internally, and nearly 75 percent are actively testing AI technologies. As these emerging technologies enter the classroom, system-level leaders must provide educators with time and support to use them in effective, safe, and responsible ways.

Digital Access Divide

> *"The Digital Access Divide stands between those students and educators who have equitable, sustainable access to connectivity, devices, and digital content, including accessibility and digital health, safety, and citizenship, and those who do not." — **2024 NETP***

While high-speed internet and devices are critical components, the NETP introduces additional foundational factors in closing the digital access divide. Because technology has the potential to create additional barriers to learning, especially for students with disabilities, the NETP emphasizes the need to develop, procure, and implement accessible tools and platforms that invite equitable participation and engagement.

In parallel, the NETP calls for leaders to invest in digital health, safety, and citizenship education, empowering students to maintain a healthy and empowered relationship with technology and the digital world. States like Delaware are leading the way by requiring the inclusion of digital citizenship and media literacy into core content standards.

With access also comes the need to promote a culture of data privacy, thereby protecting students' personal information that digital tools and platforms use. The 2024 NETP advocates for establishing policies to collect and use student data responsibly. For instance, a district might enforce strict guidelines on data security with solutions providers, fostering trust among students and parents and guardians while promoting effective data use to personalize instruction.

With its forward-looking vision for the promises of technology in K–12 education, the 2024 NETP provides the impetus for why state and federal leaders must prioritize universal connectivity. Universal connectivity sets the conditions necessary for students to use technology actively to meet their learning goals; for educators to build capacity around implementing effective and inclusive learning experiences; and for leaders to provide opportunities that reinforce digital health, safety, and citizenship skills.

In the subsequent section, we explore the current state of universal connectivity, examining various elements articulated in the 2024 NETP as well as remaining gaps that demand our collective attention.

III. Current State of K–12 Universal Connectivity

What Happened Since Broadband Imperative III?

SETDA's "Broadband Imperative III" report, published in 2019, began the conversation around students' needs to be connected even outside of school grounds. Six years later, the K–12 education landscape has gone through notable shifts. The educational technology market has exploded, aiming to support both academic growth and students' social-emotional well-being. Distance learning models, once used sparingly, became permanent fixtures in many school systems, creating more flexibility for learning. Such trends help draw attention to the value of investing in universal connectivity, as reflected in the perspectives below.

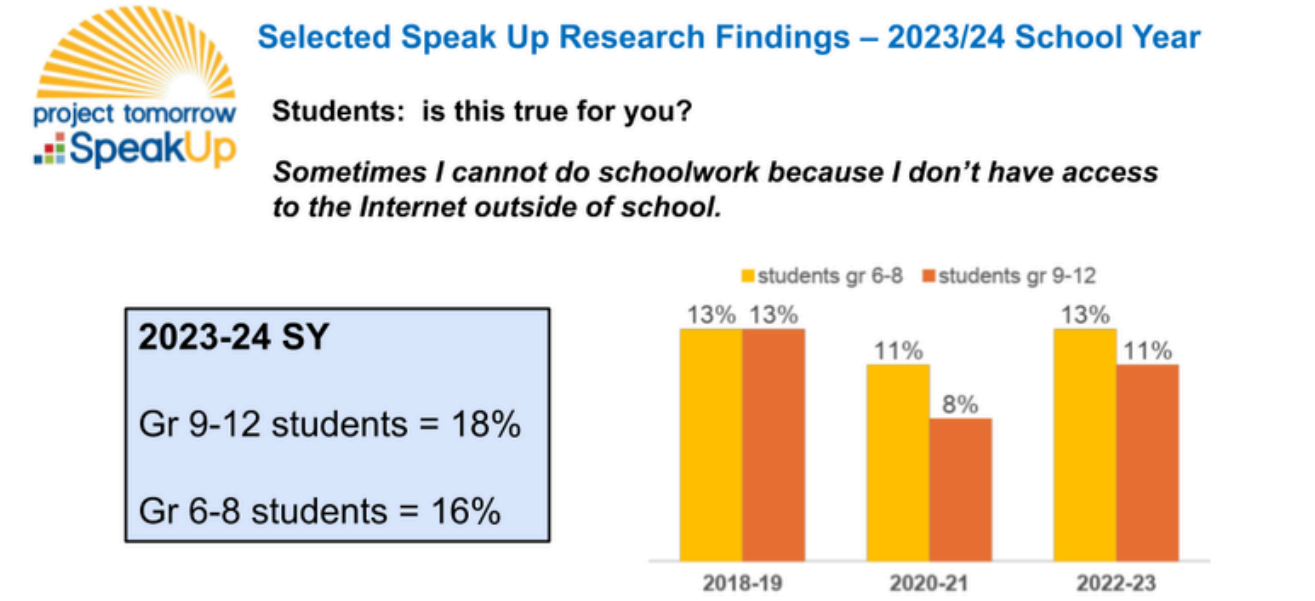
Student Perspectives

Many students understand the value of connectivity beyond the classroom, because they consistently use technology to develop career skills, observe the world beyond their surroundings, and see opportunities they may not have thought they could attain.

"Having access at home helps me dive deeper into topics that we don't cover in class. Through the use of technology and connectivity at home, I can set myself up for the path where I realize—this is what I want to study and this is what I want to do for my future." — ***Gabe Solano, Science Leadership Academy, Philadelphia***

"Everyone needs to have the same opportunities. For me personally, if I'm moving around to different houses, and I don't have a computer, I'm losing that time, and then I have to play catch-up at school." — ***Destiny Davis-Martinez, Science Leadership Academy, Philadelphia***

"Philadelphia is unique; our school pulls kids from so many different backgrounds economically, and it would be a lot harder for kids to perform at the level we are if we didn't have access outside of school. Outside of school access is so monumental because we get our news from the internet; we get world updates, we find our interests, what we like, what we dislike—not having that would be detrimental to our population. In Philadelphia in particular, a lot of students are living below the poverty line, so having the internet isn't a guarantee—it's a luxury for a lot of kids. And, our school district has shown us that we don't need to do everything in school, we don't need to learn everything in one space." — ***De'Nazia Watson, Science Leadership Academy, Philadelphia***

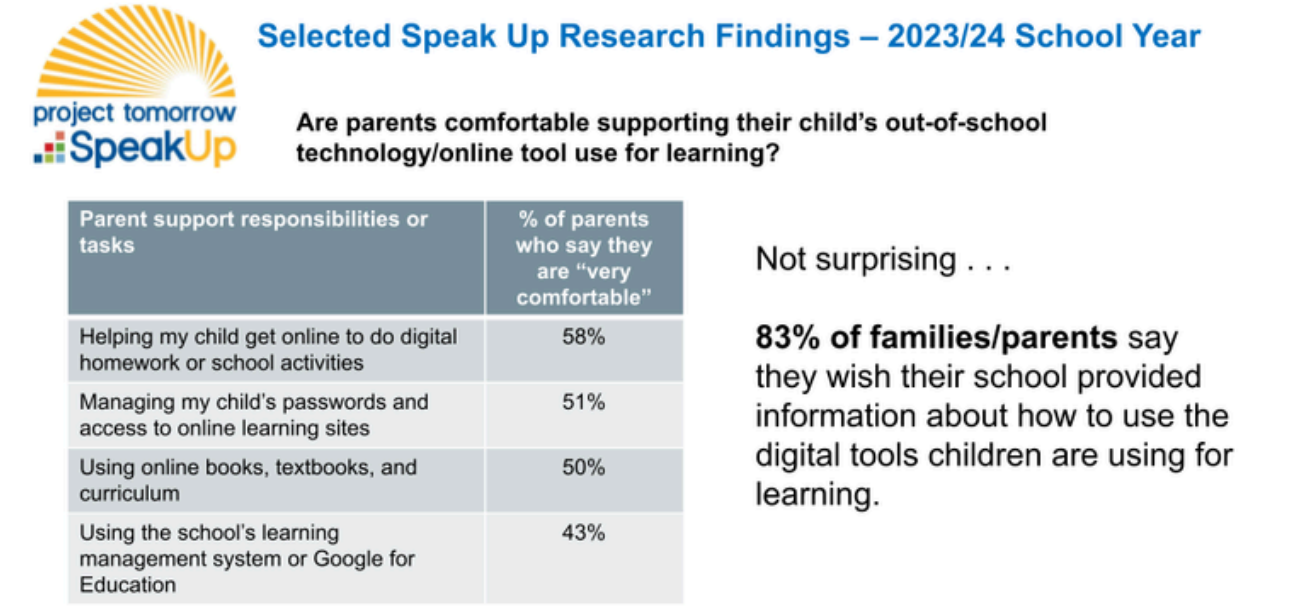


Longitudinal data from Project Tomorrow's Speak Up Survey provides additional insights into the reality that many students face, showing an uptick since the 2020–21 school year in the percentage of students who find it challenging to complete assignments outside of school due to a lack of connectivity. Furthermore, a 2022 study found that students experience slower internet speeds outside of school hours compared to in-school hours.

Parent/Guardian Perspectives

For parents and guardians, the importance of connectivity goes beyond academics; it's about providing opportunities for their child(ren) to succeed. Project Tomorrow's Speak Up Survey during the 2022–23 school year indicates that parents and guardians' biggest concern was ensuring their child was learning the right skills for future success.

Having reliable internet allows parents and guardians to stay involved in their child(ren)'s learning by keeping track of assignments and engaging in meaningful conversations about schoolwork. However, parents and guardians often find this challenging, as 83 percent shared that they wished their school provided more information on using digital tools to assist their children outside of the classroom.



*"Providing devices and hotspots for families gave the whole family much more access to email, and the internet and made communication with them much more accessible. When we couldn't meet with families in person, we felt so removed from our students and families in the virtual setting. While we had a requirement pre-COVID to send weekly communication, it was often in printed format. Once we began communicating with families regularly through the internet, especially in a way that allowed them to respond to us, our communication became more meaningful and effective."— **Jennifer Orr, Educator, Fort Belvoir Upper School, Fort Belvoir, VA***

Educator Perspectives

During the pandemic, teachers like Gerri Maseklony in Virginia's Arlington Public Schools (APS) quickly realized that students were divided by access to technology.

While some could join virtual lessons without issue, many of Maseklony's English learner students were left on their own without much support. Many of them, who worked in addition to attending school, required mobility to complete homework. Therefore, even though they were assigned laptops to take home, they often resorted to using their cellphones.

What began as a two-week out-of-school plan dragged on for an entire school year, and students required more technical support beyond their current capabilities. APS quickly created support stations outside of school and worked with internet service providers to deliver Wi-Fi hotspots to students at their homes.

"My students were incredibly committed to continuing their learning during the 2020 school year, sitting outside the public library or in the school parking lot to join classes or complete assignments online." — ***Gerri Maskelony, Arlington Tech, Arlington, VA***

Educators remain deeply concerned about students' lack of internet access outside the classroom, seeing it as a major barrier to effectively integrating technology into instruction. When they were asked what would help them use technology more effectively, the top response was "confidence that students have reliable internet access beyond school hours."

Community Perspectives

When school buildings reopened, many communities experienced a mix of excitement and relief. Schools have long been the heartbeat of many communities, and the pandemic highlighted their vital role in supporting students and families.

The Lower Kuskokwim School District (LKSD), with approximately 4,100 students who primarily speak Yup'ik, is spread across 29 schools in Western Alaska. Spanning 21,000 square miles, LKSD is the largest rural school district in the state. While investments for connectivity in rural Alaska for schools have seen progress, the same has not been true outside of the classroom.

"We were already a one-to-one laptop school district and had invested heavily in technology for our schools. When the COVID-19 pandemic closed our schools, we sent students home with no means to continue their education except for paper and pencil school work packets. We came together as a community, working with our internet service provider to look for ways to provide home connectivity. Our students' families welcomed the connectivity, but needed adequate skills to help their child(ren) with the technology. Teachers worked tirelessly to provide training, but learning was lost for many reasons, including language barriers, lack of hands-on training for parents due to the pandemic concerns, local infrastructure limitations, and lack of immediate on-site technical support." — ***Dan Walker, former Superintendent Lower Kuskokwim School District***

Industry Perspectives

The surge in internet usage during the pandemic placed unprecedented demands on the nation's broadband infrastructure. Many industry leaders rose to the challenge, as internet service providers (ISPs) of all sizes took action to expand and upgrade networks to meet the increased demand and reach more households. These efforts enabled millions of families to adapt to a new reality of working and learning from home.

Even in cities where broadband was widely available, many families faced significant affordability barriers. Parents and guardians, already stretched thin by financial struggles, were forced to make impossible choices—paying for groceries or upgrading to high-speed internet. In response, ISPs launched or expanded financial assistance programs for low-income households, offering free or low-cost internet to eligible families. Over 800 providers voluntarily signed the Keep Americans Connected Pledge, committing to maintain service for residential and small-business customers struggling with nonpayment, waive late fees, and open community Wi-Fi hotspots to those in need.

Despite these efforts, challenges remained. Some plans came with limitations, including slower speeds or unreliable connections, which left many students struggling to keep up with virtual learning. These temporary measures often functioned as "band-aid solutions," falling short of fully addressing the digital access divide. Recognizing these gaps, industry leaders partnered with schools, nonprofits, and educational technology companies to implement targeted initiatives for low-income families. For example, Charter Communications Inc.'s (Charter's) "Stay Connected K–12" program collaborated directly with schools and districts to provide high-speed access to students, educators, and staff at home.

Collaborations and partnerships between the public and private sector reflect a strong commitment to expanding broadband access and affordability, but they also serve as a reminder of the work that remains to address the digital access divide.

Universal Connectivity Investments

The surge in internet usage during the pandemic placed unprecedented demands on the nation's broadband infrastructure. Many industry leaders rose to the challenge, as internet service providers (ISPs) of all sizes took action to expand and upgrade networks to meet the increased demand and reach more households. These efforts enabled millions of families to adapt to a new reality of working and learning from home.

ESSER Funds

ESSER funding began with an allocation of $13 billion through the CARES Act, known as ESSER I. This was followed by an additional $54 billion under the CRRSA (ESSER II) and, later, $122 billion through the American Rescue Plan (ESSER III). These funds played a crucial role in helping schools purchase essential technology, such as laptops, Wi-Fi hotspots, and other devices.

Emergency Connectivity Fund (ECF)

Congress authorized the FCC to administer the ECF, a $7 billion program to help E-Rate eligible schools and libraries cover the cost of internet-enabled devices and Wi-Fi hotspots. Although this program made great strides by enabling more students to access online learning platforms and resources, ECF sunset in mid-2024, and many districts now face the challenge of sustaining these efforts by themselves.

Affordable Connectivity Program (ACP)

ACP provided 23 million households with discounts of up to $30 per month for internet service and $75 for those on tribal lands, but this critical program sunset in May 2024. A recent study surveyed roughly 2,500 households with an annual income of less than $50,000. Of the respondents, 13 percent of ACP recipients would cancel service without the benefit, leading to almost 3 million households without internet connectivity and 8.3 million households downgrading to slower, cheaper plans. This is especially concerning for K–12 students that live in these households.

Infrastructure Investment and Jobs Act

There has been a long history of chipping away at the digital access divide across the nation through programs such as:

- E-Rate, which through the Universal Service Administrative Company provides schools and libraries affordable broadband and telecommunications services with discounts ranging from 20 percent to 90 percent depending on economic need.
- Rural Digital Opportunity Fund, an FCC program investing $20.4 billion for gigabit broadband networks in rural areas.
- Capital Projects Fund, administered by the U.S. Department of the Treasury, which provides $10 billion to states, territories, and tribal governments to fund capital development projects, which may include broadband infrastructure.
- ReConnect, administered by the U.S. Department of Agriculture, which provides loans and grants to cover the cost of broadband infrastructure in rural areas.

However, these funds have usually targeted the most reachable geographies (i.e., those with foundational infrastructure or some existing level of connectivity), leaving many populations behind. Additionally, as the demand for bandwidth continues to rise, areas that were once considered served now find their internet inadequate.

In 2021, a once-in-a-generation investment, the Infrastructure Investment and Jobs Act (IIJA), provided over $65 billion to ensure access to affordable, reliable, and high-speed internet across the country, including in hard-to-reach geographies. The NTIA is playing a central role in administering these funds, working closely with state and local governments.

The most significant program in the IIJA — the Broadband Equity, and Deployment (BEAD) program — provides $42 billion for broadband infrastructure projects in unserved areas (i.e., speeds below 25 Mbps download and 3 Mbps upload), followed by underserved areas (below 100/20 Mbps), then community anchor institutions (e.g., schools, libraries, health clinics, centers, hospitals, public safety entities, public housing authorities, and community centers) with less than 1/1 gigabit per second (Gbps) speeds.

The BEAD program is promising for many states because they believe they will have sufficient funding to connect all unserved and underserved areas within their jurisdiction. For example, states like Indiana appear well positioned to reach all eligible premises and will have additional funds to support broadband adoption efforts, as reported in the state's report.

However, experts have identified that this will not be the case for all states. Twelve states estimate the cost to provide service to all areas will exceed their BEAD allocations.

As shown, the U.S. has made significant progress in broadband deployment. However, the nation must address many other obstacles and challenges to realize the potential for universal connectivity, including affordability. Although NTIA mandated that states receiving BEAD funding offer at least one low-cost broadband option, and most states recognize that affordability is a critical barrier, ACP's sunset means that many households will still have to consider cost before choosing to subscribe.

Common Sense Media's Affordable Broadband Data and Story Map provides information about the number of students who will fall into the digital access divide. The depletion of ECF has also created a gap for students, and the loss can be viewed through Common Sense Media's State ECF Data Tool, which provides the total number of internet connections and devices that will no longer be available.

On the other hand, ESSER injected billions of dollars into schools to mitigate the effect of the COVID-19 pandemic, allowing schools to provide connectivity and devices for students, especially those living in limited-income areas. The expiration of ESSER also severely impacts schools' ability to continue engaging in digital learning opportunities.

The following subsections expand on this story since 2019 regarding various dimensions of digital inclusion, underlining ongoing challenges that need to be addressed, spotlighting progress made in remedying existing gaps, and including notes about strategies necessary to help sustain and accelerate efforts.

Equitable Access to Reliable, Affordable Broadband and Internet-Enabled Devices

- Internet and device access issues beyond school grounds
- Instructional limitations due to home connectivity concerns

- Flexibilities in existing federal funds
- Public-private partnerships to expand access
- State-led sustainability and affordability efforts

- Permanent solutions for internet affordability and device sustainability
- Use of common standards to measure program impact
- Household data collection led by states

Economic Implications

K–12 students' opportunities are dependent on their access to reliable, affordable broadband. However, approximately 16 million K–12 students were impacted by the digital access divide at the height of the pandemic, with a disproportionate number of students living in limited-income and rural geographies.

Students who do not have access to the internet outside of the classroom or depend on a cellphone are marginalized for future earnings. In addition, prior research has found that students from limited income backgrounds, those from racial or ethnic minority groups, those with lower digital skills, and those who depend on a cellphone have lower GPAs and lower scores on standardized exams. Historically, high school GPA strongly predicts future earnings. Therefore, this academic gap for disconnected students leads to a 4 percent to 6 percent lower expected annual income, amounting to $22 billion to $33 billion yearly GDP loss across the entire K–12 cohort caught in the digital access divide.

> *"At the national level, addressing equitable access would increase labor productivity by 1.1%—a $160 billion boost to annual GDP. Locally, broadband deployment can generate three- to four-fold economic returns over the initial cost of investment." —* ***Common Sense Media & Boston Consulting Group, 2022***

Mental Health

The impact of equitable access goes beyond academic growth and earning potential; it also can affect students' mental health. With in-person care and support often difficult for individuals to access, due to geographic barriers or societal stigma, many young people are turning to online resources for their behavioral health needs. Of the young people surveyed in a recent poll, 65 percent have searched online for behavioral health topics, and 53 percent said they have looked for mental health information from health-focused websites.

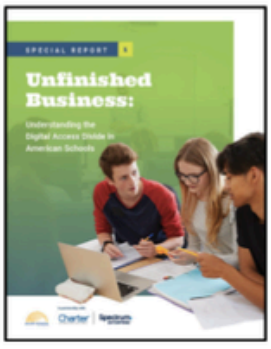
Youth from communities of color and the LGBTQ+ community are particularly reliant on digital self-help tools. According to the recent data, Latino youth were more likely to report accessing online therapy than their white peers (34 percent vs. 23 percent), and LGBTQ+ youth are about twice as likely as their non-LGBTQ+ peers to report ever having attended online therapy.

Internet-Enabled Devices

The COVID-19 pandemic rapidly accelerated the progress toward one-to-one devices for K–12 students. Project Tomorrow's Speak Up Survey findings for the 2023–24 school year show that 84% of teachers say their students have access to a device at school. However, as schools have returned to the physical classroom, many have scaled back on allowing students to take these devices home. As shown below, for schools across many categories, the percentage of students who can take their device home is 50 percent or less.

project tomorrow SpeakUp

Selected Speak Up Research Findings – 2023/24 School Year



Yes, my students are assigned a digital learning device	Percentage of teachers				
	All teachers	Teachers in urban schools	Teachers in suburban schools	Teachers in rural schools	Teachers in Title 1 schools
In school access only	36%	53%	38%	33%	50%
In school + students can take their devices home	**48%**	**25%**	**47%**	**51%**	**36%**
Total percentage of students assigned a device	84%	78%	85%	86%	86%

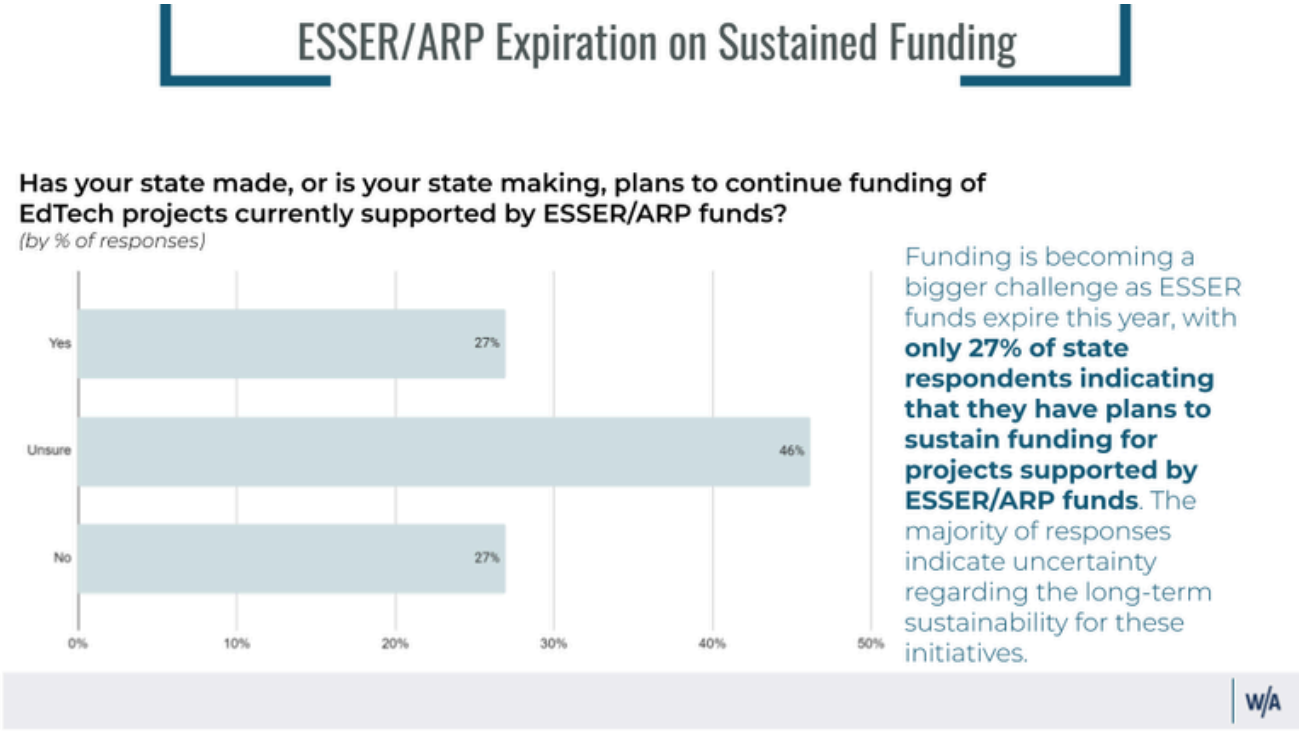
@ProjectTomorrow #SpeakUpEd 2023

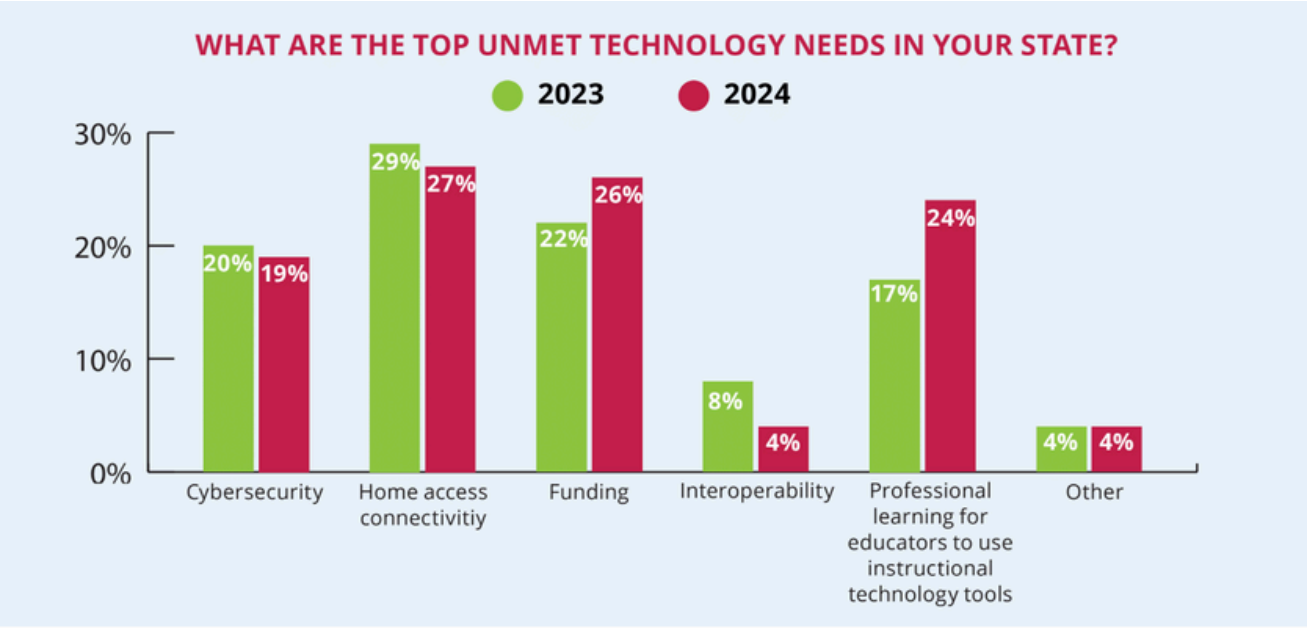
The impact of the digital access divide on students' educational experiences is exacerbated by teachers' decisions to avoid assignments that require internet connectivity. In turn, students will have limited learning opportunities and be deprived of developing essential skills, from digital citizenship to computational thinking.

> *"Over 40% of Title I teachers do not assign work that requires internet access because they fear that doing so would exacerbate inequalities, and nearly 60% report that a lack of home internet and computers limits student learning." —* ***2023–24 School Year, Project Tomorrow Speak Up Research Findings***

Remaining Challenges

Equitable access to reliable and affordable broadband and internet-enabled devices remains a significant challenge for millions of K–12 students, particularly those in limited-income, rural, and marginalized communities. Due to the expiration of ESSER, many states like North Carolina are expecting to not have enough resources to refresh school-provided devices for students, SETDA's "2024 State EdTech Trends Survey and Report" also finds that only one-quarter of states have a plan to sustain technology initiatives supported by ESSER. With an estimated 92 percent of local education agencies using ESSER funds to purchase digital tools and solutions, state leaders identifying funding for technology as a top unmet need increased from 22 percent to 26 percent.





Examples of Progress

Despite these challenges, federal, state, and local leaders as well as nonprofit organizations are making progress to expand equitable access to reliable and affordable broadband and internet-enabled devices.

Federal Leadership

Building on the longstanding success of the E-Rate program, the FCC announced the "Learn without Limits Initiative," updating service eligibility to include Wi-FI on school buses, hotspots, and cybersecurity solutions. The FCC has also made progress in developing a Broadband Data Collection map, which includes location-based data on fixed and mobile broadband availability.

State and Local Leadership

Hamilton County Schools (HCS) in Chattanooga, Tennessee, has developed HCS EdConnect, a public-private partnership between the Chattanooga Electric Power Board (EPB) and HCS. The EPB laid the foundation for the partnership by deploying a communitywide fiber optic network, and today—with the help from funders including Hamilton County, the City of Chattanooga, Blue Cross Blue Shield of Tennessee Foundation, and the Smart City Venture Fund—this infrastructure is available for students enrolled at HCS. Within the first year, this collaboration connected over one-third of HCS students in their homes. Philadelphia's ConnectED Initiative also focuses specifically on K–12 student households, providing free fixed or mobile internet connection. In addition, Philadelphia families can connect with a digital navigator for one-on-one support as well as other digital resources across the city.

SETDA's "2024 State EdTech Trends Survey and Report" shows that 85 percent of states are starting or continuing initiatives to support home broadband and device access. For instance, many are leading the way in collecting actionable data. The Wisconsin Department of Public Instruction collects data to help school districts track the extent to which their students are connected and identify possible internet providers that can serve their location. Similarly, the Washington Broadband Map, which the Washington State Department of Commerce developed, provides policymakers and communities with a view into service availability for each home, business, and other location in the state. The state is now also collecting data to support K–12 device replacement. In Indiana, the state's Department of Education created the Digital Readiness Dashboard, which tracks various longitudinal data points from student device access to per-student bandwidth. Finally, the Kentucky Digital Readiness Survey provides longitudinal data that tracks trends for school and district technology infrastructure, providing snapshots that leaders can use to determine funding needs and assess progress toward state goals.

Other states are tackling the issue of device sustainability. For example, the Connecticut Commission for Educational Technology produced the "K–12 Technology Sustainability Guidance for School and Community Leaders" report, providing guidance on how to maximize a district's use of limited funding. The brief outlines steps for blending and braiding various federal programs, streamlining procurement processes, and using state-provided tools to track data on technology usage.

Many states are working directly to address affordability challenges. In New Mexico, the Office of Broadband Access and Expansion recently announced a $25 million investment to provide high-speed internet to rural students. These funds will be issued to providers partnering with schools to build fixed wireless service. The "Student Connect" assistance program will be available for students and staff in remote areas of New Mexico, providing three years of free internet. In New York, the Affordable Broadband Act requires internet providers to offer broadband service to limited-income households for $15 a month, including all taxes and fees.

Nonprofit Leadership

Connected Nation (CN) partnered with Amazon to pilot a distribution program with mesh Wi-Fi routers. CN collaborated with three distribution partners—Human-i-t, E2D, and the National Digital Inclusion Alliance—to deploy approximately 5,000 routers into homes. With footprints in Michigan, North Carolina, and California, these partner organizations helped identify target communities and distributed routers at no cost.

CN also partners with the Utah Education Network to develop an extensive survey, published every two years, that captures the state's broadband availability, device inventory, and more. The Utah School Technology Report, resulting from this partnership, was leveraged by the Utah State Board of Education (USBE) to inform the deployment of the state's ESSER funds. USBE prioritized using this grant to target support in communities most impacted by the pandemic.

Strategy Recommendations

As shown by the data and examples of progress above, the high cost of broadband and internet-enabled devices is among the most prohibitive factors to equitable access. Leaders across the country are developing funding opportunities to remedy gaps and collecting data to drive impactful investments. A permanent mechanism to address the affordability challenge is crucial to ensuring long-term equity in K–12 education. When programs like ACP, ECF, and ESSER provide temporary solutions that go away within a few years, millions of students risk losing their connection to valuable education resources, while educators become severely limited in pedagogical approaches. Establishing a permanent solution that ensures affordable and equitable access to the internet is necessary to help students thrive academically and access expanded opportunities.

Reinforcing Digital Skills for Students, Families, and Caregivers

- Students' responsible use of technology
- Rapid adoption of AI-powered tools
- Lack of consistent system-level funding and implementation

- Incorporating digital literacy/citizenship into standards
- Supporting personnel deployment and resource development
- Community-based approaches for AI literacy

- Development of state/local edtech plans
- Sustained support for ongoing professional development
- Ecosystem approach to building digital skills

Over the past few years, many leaders and communities have raised the question regarding the appropriate role that technology should play in students' everyday lives. This national discourse around "screen time" illuminates the fact that it is now more important than ever to reinforce critical student skills to safely and responsibly navigate online spaces and digital tools and platforms. These skills encompass digital literacy (skills associated with using technology to find, evaluate, organize, create, and communicate information) and digital citizenship (the ability to exhibit appropriate, responsible behavior when using technology).

To address this issue, the Digital Equity Act, part of the IIJA, provided $2.75 billion distributed between three programs to ensure all individuals can, among other items, build the skills necessary to fully participate in a digital society and economy. The first program provided states, territories, and tribal governments with $60 million to develop digital equity plans for "covered populations" (e.g., limited-income households, aging populations, incarcerated individuals, veterans, people with disabilities, people with language barriers, racial and ethnic minorities, and rural inhabitants). An additional $1.44 billion Digital Equity Capacity Grant will help states, territories, and tribal governments support the implementation of those plans and address various adoption challenges.

The third, the Digital Equity Competitive Grant program, totaling $1.25 billion, funds local initiatives with a proven track record of serving covered populations to strengthen their projects' abilities to effectively reach and serve those groups.

School districts can play a pivotal role in building essential digital skills, especially when collaborating with other sectors on initiatives like the Digital Equity Competitive and Capacity Grants. They are often positioned at the center of the community, having a unique opportunity to connect directly with families. They are also trusted messengers for parents and caregivers when it comes to the dissemination of critical information, because they can tailor the message based on their community's needs.

In building digital skills, it is also important to consider the issue of AI literacy. The rapid adoption of AI-powered digital tools, such as virtual tutoring assistants, predictive analytics, and machine learning algorithms, underscores the urgency of reinforcing AI literacy among educators and students. As AI-powered tools become more integrated into industries, the skills to understand, utilize, and navigate these tools will be increasingly critical for students' future career readiness.

Remaining Challenges

Many programs designed to enhance digital skills currently face significant challenges in engaging parents and caregivers. Research shows that schools often struggle to forge meaningful connections with parents and caregivers from diverse backgrounds, which hampers efforts to ensure they are well-informed and actively involved in building students' digital skills. The U.S. Department of Education's School Pulse Survey also shows that while 72 percent of students in public schools receive support for their digital skills, only 24 percent of their families receive this support.

The rise of AI tools in education brings opportunities for educators to personalize learning experiences. Therefore, effective strategies to build AI literacy must include a multifaceted approach that includes curriculum development support, ongoing professional development and coaching, community engagement, as well as clear policy and guidance for responsible and effective use of AI-powered tools.

Furthermore, initiatives intended to build K–12 digital skills often operate in silos, with states, nonprofits, and schools pursuing the same goals without a coordinated strategy. The potential for collaboration to bridge these gaps and strengthen community efforts is immense.

By building an ecosystem that includes schools already serving covered populations, they can tap into collective knowledge and relationships with specific communities.

Examples of Progress

Federal, state, and local leaders have made progress in developing curricula, guidance, and policies to reinforce digital skills for students, families, and caregivers. Nonprofit organizations and industry have also made significant impact through their contributions.

Federal Leadership

The Digital Resilience in the American Workforce (DRAW Initiative), which the U.S. Department of Education funds, works to prepare educators to equip learners with the knowledge and digital skills necessary for postsecondary education and training, employment, civic engagement, and economic sufficiency.

State and Local Leadership

While many states have been working to provide guidance on responsible uses of AI-powered tools in educational settings, New Mexico, Massachusetts, and Delaware policymakers have specifically worked to emphasize K–12 digital citizenship through partnerships that offer educator resources, efforts to track data on who is receiving instruction on the topic, and requirements to integrate specific skills into academic standards.

For instance, in 2023, the New Mexico Legislature passed the Digital Equity for Education Act, providing funds for the state's educational agency to engage in partnerships that foster digital citizenship practices.

Other states have been investing in personnel necessary to develop digital skills. The Washington Department of Commerce developed a Digital Navigators Program to provide a path to equitable access to telehealth, employment, education and training, and other social determinants of health. The program focuses on deploying navigators who help community members build not only basic technical skills but also skills to understand internet safety, use digital platforms, and access various public services. In addition, the Office of Superintendent Public Instruction offers digital navigator grants, through which districts are hosting multilingual workshops to help parents and caregivers learn to use various digital tools and platforms.

At the local level, districts like El Segundo Unified School District have not shied away from AI-powered tools, developing a board policy titled "Student Use of Emerging Technologies, including Generative Artificial Intelligence," which notes how these technologies should "prioritize the development of critical thinking skills,

ensuring that students can effectively evaluate the accuracy and relevance of content generated by these technologies."

In others like Lynwood Unified School District, leaders have created an AI Task Force for an inclusive approach in the development of policies, curricula, and best practices around AI. Involving district leaders, teachers, parents, students, and subject matter experts, this cross-functional team is collaborating to develop tools to help increase knowledge and capacity around the appropriate role that AI should play in educational settings.

Nonprofit Leadership

CN has trained almost 20,000 people since 2022. For example, Teens Teach Tech is a mentorship program that empowers middle and high school students to support adults in developing critical digital skills. CN's Digital Works program also delivers scholarship-funded live and virtual opportunities to provide individualized career readiness support and training on job-readiness skills. Other organizations like ISTE+ASCD have both defined and supported digital citizenship education and made additional commitments to expand professional development around AI literacy.

Industry Leadership

Intel developed the Skills for Innovation program in partnership with Lenovo, providing teachers with virtual, on-demand professional development for integrating technology in the classroom as well as a library of 100-plus lessons that integrate emerging technologies like augmented reality, virtual reality, and AI.

Strategy Recommendations

As these examples of progress demonstrate, building K–12 digital skills must be a multi-sector, whole-ecosystem commitment so that the work is sustainable and not the sole responsibility of school systems. System-level leaders must also pair K–12 digital skill-building efforts with deliberate work to engage and support families and caregivers so that they are able to reinforce student skills from home. Finally, leaders should make reliable resources available to support ongoing professional development and coaching for educators.

Technical Support & Building Awareness of Online Privacy and Cybersecurity Practices

As K–12 schools increasingly integrate technology into educational environments, online privacy and cybersecurity issues have received the national spotlight. In response, school systems have been developing policies, training personnel, implementing data security measures, filtering and monitoring software, and ensuring coordination with solutions providers. In addition, K–12 schools have acted to comply with the Family Educational Rights and Privacy Act, the Children's Internet Protection Act, and the Children's Online Privacy Protection Act, all collectively put in place to safeguard the privacy and security of students' personal information.

Remaining Challenges

Cybersecurity remains the top technology priority among state education leaders, because the number of cyber attacks doubled between 2021 and 2023. K–12 schools rank among the most frequent targets of cyber attacks and face unique challenges that require more tailored solutions than those that off-the-shelf products typically provide. The stakes are especially high because students and educators may not always have the knowledge to navigate the web in a safe and secure manner.

Cyber attacks and data breaches on K–12 schools are costly, ranging from $50,000 to $1 million per incident,

although recent incidents in New York and Texas have exceeded this amount, with monetary losses totalling $2 million to $10 million for ransomware responses. Attacks and breaches are also educationally disruptive, because the consequent learning loss can range from days to weeks, and full recovery can range from two to nine months. Furthermore, incidents can lead to the loss of trust and reputation for public institutions, depletion of resources for both students and staff, and significant privacy violations.

For many K–12 schools, limited budgets and capacity constraints pose significant challenges to maintaining safe and secure data systems. The extensive number of devices and platforms that schools use, especially those that are AI powered, further compound the issue. While AI-powered tools may have the potential to personalize learning, they process vast amounts of data including personally identifiable information. Therefore, education leaders have recently noted concerns about data privacy and security compliance with existing laws as well as additional burdens such as notifying parents and guardians to receive consent regarding the collection and use of their child(ren)'s data. Last, as schools adopt AI-driven threat monitoring systems, education leaders face the challenge of balancing safety with student privacy and reducing the potential for biased outputs.

Examples of Progress

There has been a concerted effort among federal, state, and nonprofit leaders to strengthen K–12 privacy protections and cybersecurity measures through the provision of resources, guidance, and funding. This momentum has also led private sector companies to pledge to increase security on their tools and platforms.

Federal Leadership

The U.S. Department of Education and the Cybersecurity & Infrastructure Security Agency (CISA) released the K–12 Digital Infrastructure Brief: Defensible and Resilient in 2023. This publication provides school districts with actionable cybersecurity recommendations and examples of promising practices from states and districts across the country. The federal government has also engaged in a number of partnerships to move this issue forward. For instance, more than 200 companies have signed CISA's "Secure by Design" pledge to work toward increasing use of multi-factor authentication, reducing default passwords and other vulnerabilities, publishing a vulnerability disclosure policy, demonstrating transparency, and increasing customers' ability to gather evidence of cybersecurity intrusions. Furthermore, the U.S. Department of Education's Government Coordinating Council works across various levels of government to collaboratively plan the development, implementation, and execution of the nation's critical infrastructure protection mission.

The FCC's Schools and Libraries Cybersecurity Pilot Program provides $200 million to eligible schools and libraries to support cybersecurity services and equipment. However, similar to many other programs mentioned in this report, the pilot brings long-term sustainability concerns. When pilot programs end, it is difficult for school districts to allocate funds to sustain gains.

State Leadership

There has been an increase in states enacting legislation related to cybersecurity and data privacy for schools, including requirements around planning, insurance, and capacity building. Other states have focused on breaking down siloed efforts. Examples include North Carolina, which established a Joint Cybersecurity Task Force, creating a whole-of-state collaboration to build and maintain strong practices. Similarly, the Minnesota Cybersecurity Task Force includes representation from the K–12 sector and contributed to the development of a Whole-of-State Cybersecurity Plan.

Other leaders from around Minnesota are stepping up to support schools, as one of the state's educational service agencies coordinates a student data privacy program to provide a manageable approach to achieve and maintain compliance with state and federal laws.

Most recently, the state's legislature passed a new law requiring public agencies, local governments, public education entities, and government contractors to report cybersecurity incidents that impact their entity.

Other states are providing direct funding. Leveraging the U.S. Department of Homeland Security's State and Local Cybersecurity Grant Program, Washington's state legislature invests $14 million into state agencies, higher education institutions, school districts, tribal governments, cities, counties, and special purpose districts (e.g., public utility districts) to support implementation of cybersecurity plans.

On the other hand, Connecticut is tackling procurement through the state's educational software hub. Through this platform, providers can demonstrate compliance with the state's student data privacy law, and local leaders can sort for products that meet this requirement. Connecticut found that this hub is helping local leaders save both time and financial resources that would otherwise be required to vet individual products. For example, by selecting a product from the hub that demonstrates compliance with the state's data privacy law, districts do not have to create separate agreements with vendors.

Finally, some states are investing in the necessary personnel to carry out this work. For example, Indiana's Chief Technology Officer Council has created mentorship programs for future educational technology leaders, fostering capacity-building and sustainability.

Nonprofit Leadership

California IT in Education (CITE) has created several resources on various topics, including a privacy road map, conversation guide for parents, sample language for communicating with vendors, and model customer agreements. Other nonprofits, such as K–12 SiX, provide analysis on key trends, a community of practice for information security professionals, professional development, technical assistance, and cross-sector collaboration opportunities.

Strategy Recommendations

Making K–12 a priority as statewide cybersecurity plans are built and maintained is essential for ensuring schools have the tools to safeguard staff and students from potential threats as well as supporting development of appropriate data privacy agreements with solutions providers. School districts also require guidance and targeted technical assistance on effective procurement practices that aid purchasing digital tools that safely protect student information. Last, school systems must be sustainably supported in assisting parents and guardians to use digital tools with students in a safe and secure manner.

Ensuring Inclusive Digital Tools and Platforms

- Implementation without learner variability in mind
- Lack of representation in industry exacerbates non-inclusive development

- Enforcing accessibility of tools and platforms
- Technical assistance fo schools and districts
- Investments into equitable career pathways

- Guidance to influence procurement decisions
- State adoption of UDL
- Support for R&D of inclusive tools and platforms

Ensuring inclusive digital tools and platforms is essential for creating a fair and supportive learning environment. As emphasized in the 2024 National Educational Technology Plan, using the UDL principles as a driving vision can help educators design flexible and personalized learning experiences that meet the needs of all students, no matter their backgrounds or abilities. The UDL principles advocate for multiple means of engaging with content, representing knowledge, and expressing learning, ensuring everyone has a chance to succeed.

> *"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."*
> ***— 2024 NETP***

Remaining Challenges

When digital tools and platforms are not designed from the outset with learner variability in mind, students with disabilities and their families face additional learning barriers that can significantly impede their educational experience. Therefore, adequate support to develop and implement accessible and assistive technologies is necessary for creating a learning environment where everyone can thrive. Furthermore, the challenge of inequitable representation in the technology industry leads to a variety of systemic issues that affect society at large. When teams creating products are not representative of the populations they intend to serve, solutions often overlook marginalized communities' unique needs and experiences.

Examples of Progress

Leaders at the federal and nonprofit levels continue to advocate for inclusion in K–12 education, going beyond calls for developing accessible tools and platforms.

Federal Leadership

The DOJ's new Americans with Disabilities Act Title II Regulations set Web Content Accessibility Guidelines (WCAG) Version 2.1, Level AA as the technical standard for state and local governments' web content and mobile applications. This federal policy will help ensure that students with disabilities benefit from increased access to information that their school systems communicate

The U.S. Department of Education's Office of Special Education Programs (OESP) funds the development and dissemination of accessible educational materials, accessible technologies, and assistive technologies. Furthermore, OSEP recently launched the National Center on Accessible Digital Educational Materials & Instruction to provide resources and technical assistance that help education leaders evaluate, procure, select, create, and use accessible tools and help parents communicate their children's needs with schools.

Nonprofit Leadership

In addition to developing and updating the UDL framework to help make educational content more inclusive, CAST provides professional development and resources on inclusive practices for students with disabilities, who often face barriers to learning.

The Kapor Foundation has distributed funds and developed actionable guidance to help implement a culturally responsive K–12 computer science pathway for schools and districts, ensuring Black, Hispanic, and Indigenous students have equitable access to the technology sector. Kapor also works with technology industry leaders to promote diversity and retention and build a workforce that reflects the broader society.

Strategy Recommendations

School systems need sustainable funding and technical assistance to integrate inclusive digital tools and platforms—such as accessible educational materials, accessible technologies, and assistive technologies—into instruction and everyday classroom activities. In addition, there needs to be additional collaboration between education and industry leaders to build equitable pipelines that offer historically underrepresented populations the opportunity to succeed in growing industry sectors.

IV. Future Policies for K–12 Universal Connectivity

The report thus far explored challenges and progress associated with various elements of digital inclusion to assess the current state of K–12 universal connectivity. This final section synthesizes the above mentioned "strategy recommendations" into actionable state and federal policies that can help remedy existing gaps. These recommendations, encompassing both "big P" policies like legislative action and "little P" policies like system-level guidance and technical assistance, are designed to support the following benchmarks for universal connectivity:

- All K–12 students can access internet services that meet or exceed the FCC's new broadband benchmark speed (100/20 Mbps), ensuring reliable connectivity regardless of location within their communities.
- All K–12 students have individual access to at least one internet-enabled device. For devices that school systems provide, a structured device life cycle ensures they are refreshed every three to five years, maintaining functionality and compatibility with current technologies.
- All K–12 students, through schools and other community institutions, have access to digital skill-building opportunities aligned to a community-developed portrait of a learner/graduate, which supports their growth as digital citizens who are resilient to emerging technologies. K–12 families and caregivers also receive access to these opportunities.
- All students can access digital tools and platforms that protect their own and their families' personally identifiable information and receive consistent technical support for safe and secure web navigation.
- All students access digital tools and platforms that are responsive to their variability as learners, helping historically marginalized populations access an expanded array of educational and career opportunities.

Broadband and Devices

Goal: All K–12 students can access internet services that meet or exceed the FCC's new broadband benchmark speed (100/20 Mbps), ensuring reliable connectivity regardless of location within their communities. All K–12 students have individual access to at least one internet-enabled device. For devices that school systems provide, a structured device life cycle ensures they are refreshed every three to five years, maintaining functionality and compatibility with current technologies.

State legislators can kickstart initiatives to regularly collect longitudinal data on the state of K–12 universal connectivity and commit to using that data to drive critical investment decisions. The below blueprint from the Council of Chief State School Officers (CCSSO) and Education Superhighway provides examples of data elements that state leaders may consider. The blueprint provides a more nuanced look at connectivity rather than a binary approach of simply asking whether households are "connected" or "disconnected."

State broadband leaders can also leverage their authority through the BEAD program's Low-Cost Broadband Service Option to enforce long-term, affordability requirements for internet service providers that they work with while ensuring requirements for service quality. The National Digital Inclusion Alliance (NDIA) offers resources that help define high-quality affordable services, such as cost, speed, performance, eligibility criteria, barriers to enrollment, and technology type.

At the federal level, Congress can commit to protecting affordability programs with a proven track record of effectively serving constituents. This includes preserving the integrity of the Universal Service Fund, which is currently under challenge in the judicial system; ensuring that the program has a robust revenue source; and preserving its flexibility to support off-campus access. Additionally, policymakers can consider legislation like the ACP Extension Act to provide relief to households that have experienced rising costs since the end of ACP.

Finally, federal agency leaders can commit to a multi-agency effort to use common data standards to track federal programs' impact. This coordinated effort would aid in identifying both geographic areas and digital inclusion elements in need of greater investment, identifying the impact of government funds in K–12 universal connectivity, and reducing duplicative efforts to ensure good stewardship of taxpayer dollars. NTIA has already made several recommendations to Congress to move in this direction.

Data Elements from CCSSO Digital Access Data Collection Blueprint

Data Field	Question	Response Options
Digital Device	What device does the student most often use to complete schoolwork at home?	Chromebook Desktop computer Laptop computer Tablet Smartphone Other None
Device Access	Is the primary learning device a personal device or school-provided? Is the device shared?	Personal - Dedicated Personal - Shared School Provided - Dedicated School Provided - Shared None
Internet Access in Residence	Can the student access the internet on their primary learning device at home?	Yes No
Internet Access Type in Residence	What is the primary type of internet service used at home?	Fiber Cable DSL Microwave Satellite Dial-up Personal hotspot/smartphone School-provided hotspot Unknown Other None
Internet Performance	Can the student stream a video on their primary learning device without interruption?	Yes, with no issues Yes, but not with consistent quality No

Digital Skills

Goal: All K–12 students, through schools and other community institutions, have access to digital skill-building opportunities aligned to a community-developed portrait of a learner/graduate, which supports their growth as digital citizens who are resilient to emerging technologies. K–12 families and caregivers also receive access to these opportunities.

Both state and federal legislators can invest in efforts to build critical digital skills and AI literacy among students, families, caregivers, and educators. Such efforts may take the form of guidance and technical assistance to help schools and districts create dedicated educational technology plans. According to SETDA's "2024 State EdTech Trends Survey and Report," almost 90 percent of states responded that they do not require districts to develop an educational technology plan.

In addition, targeted funding can help spark local efforts toward this end. Lawmakers have currently proposed several pieces of relevant federal legislation, including:

- Artificial Intelligence Literacy Act, which would amend the Digital Equity Act to allow AI literacy-building efforts to be an eligible use of funds.
- NSF AI Education Act, which—among other measures—would build the capacity of the National Science Foundation (NSF) to provide professional development opportunities to educators in building AI literacy.
- LIFT AI Act, which would create new grants at the NSF that support higher education institutions and nonprofit organizations in building AI literacy curricula and professional development opportunities.

Technical Support, Online Privacy, and Cybersecurity Practices

Goal: All students can access digital tools and platforms that protect their own and their families' personally identifiable information and receive consistent technical support for safe and secure web navigation.

State leaders can ensure a coordinated and strategic approach to cybersecurity, fostering safer digital environments for students and educators alike. In doing so, state agency leaders can establish a multi-agency task force, including representatives of K–12 schools, and convene entities that can readily share information related to potential threats. State legislators can also commit to funding system-level efforts that support local education agencies in designing procurement processes that protect student information.

At the federal level, leaders at the FCC can evaluate outcomes of the E-Rate Cybersecurity Pilot program to determine how federal agencies can continue supporting this issue after the pilot's conclusion. Furthermore, in response to the U.S. Government Accountability Office's recommendations around interagency coordination, Congress can reinforce agencies' capacities to provide guidance and technical assistance as emerging technologies enter classrooms and additional students are connected to digital tools and platforms from home. Such efforts may include the Enhancing K–12 Cybersecurity Act, which funds CISA to "establish an information exchange to disseminate information, best practices, training, and resources to improve cybersecurity in elementary and secondary schools" as well as a "registry of information relating to cyber incidents affecting information technology systems owned or managed by [an elementary school, secondary school, local educational agency, state educational agency, or an educational service agency]."

Inclusive Platforms and Tools

Goal: All students access digital tools and platforms that are responsive to their variability as learners, helping historically marginalized populations access an expanded array of educational and career opportunities.

State agency leaders can take proactive measures to ensure all K–12 students have access to digital platforms and tools tailored to meet their diverse needs. By setting statewide standards for accessibility and fostering partnerships with solutions providers, they can support the deployment of technology solutions that promote more inclusive learning experiences. This can include publishing guidance for local education agencies on what to look for when developing partnerships with solutions providers, as demonstrated by the Oregon Department of Education's digital instructional materials toolkit.

State agency leaders can also prioritize collecting and analyzing data to ensure students with disabilities have access to and can effectively use accessible technology not only at school alongside their peers but also off school grounds. Additionally, state education leaders can adopt UDL principles at the state level as a foundational framework. By embedding UDL into decisions around curriculum, professional development, and procurement, state agencies can lead the charge in fostering inclusive, adaptable learning environments.

At the federal level, the DOJ, under Title II of the Americans with Disabilities Act, has recently made significant progress in ensuring accessible educational opportunities.

Through a new rule, the DOJ requires—with limited exceptions—that web and mobile applications and content, which public services use, meet WCAG 2.1, Level AA. The DOJ, in collaboration with OSEP in the U.S. Department of Education, can bolster efforts to provide guidance and technical assistance to school systems in meeting this requirement, such as those that the National Center on Accessible Digital Educational Materials & Instruction leads.

Finally, as Congress considers reauthorizing the Institute for Education Sciences (IES) at the Department of Education, lawmakers can ensure that there is a specific requirement that IES' research and development efforts focus on serving historically underserved populations. For example, the NEED Act would establish the "National Center for Advanced Development In Education" (NCADE) within IES, charged with identifying "new solutions for teaching and learning, with an emphasis on breakthrough technologies." The draft legislation requires that NCADE "identify, develop, and promote community-informed advances in teaching and learning that have the potential to transform education practices across…special education and services for students with disabilities; and services for English learners."

Overarching Implementation Considerations

We conclude with several overarching implementation considerations that state and federal policymakers must keep in mind as they act on any of the above policy recommendations.

Commitment to Equity

State and federal policymakers must commit to continuous monitoring and evaluation of policy initiatives to ensure that investments are increasing equitable access across all K–12 demographics. In doing so, NTIA should consider designating K–12 students as a covered population under the Digital Equity Act, because K–12 has thus far received somewhat limited attention within state digital equity plans. This action would ensure that the implementation of these plans can specifically target learners from historically marginalized populations.

Sustainable Funding

As mentioned throughout Section III, reliable funding is a significant barrier to sustaining system-level efforts that strive to increase universal connectivity. Funding can also support staffing needs to effectively implement new programs. Policymakers can consider several options to provide consistent resource streams, including at the federal level:

- Leveraging the bipartisan Universal Service Fund working group to develop proposals around how this critical affordability program can sustain revenue and its mission to connect K–12 students.
- Reintroducing the Digital Equity Foundation Act, which would take initial steps to establishing an independent foundation with a goal to "expand access to broadband internet and promote digital literacy, inclusion, and equity." The Digital Equity Foundation would "carry out a range of activities to advance its mission, such as awarding grants and establishing for-profit subsidiaries to stimulate economic development and attract investment partners."
- Restoring the Enhancing Education Through Technology (E2T2) program, which up until 2011 played a critical role in developing and implementing state and local educational technology plans, as part of the overdue reauthorization of the Elementary and Secondary Education Act.

Adaptive Guidelines to Evolving Technological Landscapes

As the role of emerging technologies continues to grow in educational settings, it will be inevitable that users will demand additional bandwidth in a matter of years, and geographic areas considered well-connected today may soon be inadequately served.

Federal and state policymakers therefore will need to be mindful of local variables as they determine the types of technologies that various programs support as well as the definition of "adequate" broadband. Federal leaders are already demonstrating capacity for an adaptive mindset. NTIA recently released guidance on how a "mix" of technologies can help meet the BEAD program's goals, while the FCC set a 1 Gbps/500 Mbps long-term goal for broadband speeds.

Reimagining the Enhancing Education Through Technology Program for the Modern Era

The 2024 NETP, which serves as the U.S. Department of Education's flagship educational technology policy document, envisions a future where all students use digital tools actively to learn, all educators have support to design those classroom experiences, and all communities can readily access foundational connectivity, devices, and digital content. The original $1 billion E2T2, established under the No Child Left Behind Act, played a critical role in developing and implementing state and local plans that reflected this vision. For example, SETDA's 2010 report examining all states' investments found that the top E2T2 priorities were:

1. Professional development (top priority in 34 states).
2. Increasing achievement and digital literacy (top priority in six states).
3. Increase access to technology (top priority in four states).

However, the program lost funding in 2011 and was excluded from the 2015 Every Student Succeeds Act (ESSA), marking a significant shift in federal support of educational technology. Since then, educational technology has been subsumed under broader block grants, such as the Student Support and Academic Enrichment Program (Title IV-A) and Supporting Effective Instruction Program (Title II-A), resulting in a dilution of focus and resources. Furthermore, the end of the current Administration coincides with several challenges.

- Federal Program Expirations: The Department of Education's ESSER fund, which supported technology-enabled teaching and learning, was fully obligated by September 2024. The FCC ECF, which provided $7.1 billion to purchase equipment, sunsetted in June 2024. Finally, the FCC's ACP connected 23 million households to broadband at a discounted rate. Although many ACP recipients used the program to access school work, the FCC exhausted its $14 billion in May 2024. A new program is necessary to sustain the significant gains made through these programs.
- Unprepared for Emerging Technologies: As innovative tools like generative AI make their way into educational environments, there is an increasing need to support states and districts by offering guidance and professional learning. While half of students aged 14–22 report using generative AI, including for schoolwork, 70 percent of educators have not yet received training on how to use AI effectively and responsibly.

- Urgency for Digital Citizenship: The surgeon general's recent actions to recommend warning labels on social media as well as bans on cellphones in schools that several states and local school boards approved call for additional capacity at the state and local levels to support digital citizenship education.
- Educator Attrition: Due to increased pressures faced during the pandemic, educator attrition rates have increased. Although many policy solutions can help counter this issue, research suggests that educators who do not feel supported in their roles are more likely to leave the profession. With the average district now accessing nearly 3,000 different technology tools in a given school year, educators are more likely to feel lost in selecting and deploying the most appropriate options. States and districts require additional capacity to help educators navigate vast quantities of digital tools, thereby bolstering a feeling of professional support.

ESSA turned nine years old in December 2024, and the legislation included authorization levels for many programs only up until fiscal year 2020. The 119th Congress has an opportunity to examine the legislation and authorize new programs that respond to current challenges.

A reimagined E2T2, authorized at a minimum of $1.8 billion, can be provided to states and districts through the Department of Education's Office of Elementary and Secondary Education (OESE), which has experience in administering large national programs. A 1.5% national activities set aside—which the OESE and the Office of Planning, Evaluation, and Policy Development reserves—can offer means for evaluating the impact of the program as well as providing technical assistance through convenings and federal guidance on impactful investment strategies.

Similar to the original E2T2, state education agencies should receive their share of funds via Title I formula upon submission of a long-range statewide educational technology plan informed through adequate community input (e.g., see the U.S. Department of Commerce's guidance on soliciting public comments and engaging community organizations). States should be permitted to reserve a maximum of 5% of funds received to carry out various coordination activities, including the establishment of a dedicated educational technology office that reports to the chief state school officer and responsible for governing program implementation. The remainder of the funds should be subgranted through a mix of formula and competitive grants to local educational agencies and consortia of eligible entities (e.g., districts, nonprofits, higher education institutions, community anchor institutions).

Allowable uses should include activities to close the three digital divides articulated in the 2024 NETP. For example, the reimagined E2T2 can support the current national AI strategy by allowing funds to be invested toward closing the "digital use divide," providing opportunities for students to build AI literacy skills and use AI tools to examine and solve community problems. States and districts could also use the funds to close the "digital design divide" by providing educators with ongoing professional development and reinforce their abilities to align instruction with the Universal Design for Learning principles. Finally, states and districts could use the funds to close the "digital access divide" by allowing schools to procure accessible technology solutions, support students' universal broadband access, or establish a state or local cabinet-level edtech director position.

In 2025, federal policymakers have an opportunity to begin critical discussions around the E2T2 modernization by taking specific action steps.

- The Senate Health, Education, Labor, and Pensions Committee and the House Education and Workforce Committee can introduce steps to reauthorize ESEA as well as seek input from educators and education leaders on new program considerations.
- The White House Domestic Policy Council and Office of Management and Budget can advocate for the reimagined E2T2 in the president's annual budget request.
- The secretary of education, alongside the Department of Educations' assistant secretary for policy, evaluation, and policy development and assistant secretary for legislation and congressional affairs, can engage the public and legislators to build support for the reimagined E2T2.

The reimagined E2T2 represents a critical opportunity to address many pressing challenges in K–12 education while preparing students for the future. As we approach the reauthorization of ESEA as well as consider policy solutions to fully harness the promises of emerging technologies like AI, providing systems with dedicated support for closing the three digital divides can significantly enhance the quality and equity of education across the United States.

V. Conclusion

To realize and ensure an equitable future for all K–12 students, federal and state policymakers must prioritize sustained investments in universal connectivity. While the ongoing implementation of the Infrastructure Investment and Jobs Act promises significant progress in broadband infrastructure deployment, the expiration of critical programs like ESSER, ACP, and ECF will continue to leave a gap for many American households, including those with K–12 students. Addressing this gap is essential to bridging the digital access divide and supporting all learners' educational success.

Achieving universal connectivity requires more than building the necessary infrastructure. As underscored in the report through stories, quotes, and data, it necessitates ongoing investment in reliable and affordable internet service; sustainable at-home device access; opportunities for students to create, navigate, and interact responsibly with digital tools; continuous professional development and technical support for educators; and inclusive design of platforms and tools to accommodate diverse needs of all students. These efforts are vital to ensuring that universal connectivity leads to equitable and impactful learning opportunities for every learner.

Call to Action

To build a future where every student can thrive, we call on federal and state leaders to champion policies and programs that strive toward the following goals to achieve universal connectivity in K–12 education:

- All K–12 students can access internet services that meet or exceed the FCC's new broadband benchmark speed (100/20 Mbps), ensuring reliable connectivity regardless of location within their communities.
- All K–12 students have individual access to at least one internet-enabled device. For devices that school systems provide, a structured device life cycle ensures they are refreshed every three to five years, maintaining functionality and compatibility with current technologies.
- All K–12 students, through schools and other community institutions, have access to digital skill-building opportunities aligned to a community-developed portrait of a learner/graduate, which supports their growth as digital citizens who are resilient to emerging technologies. K–12 families and caregivers also receive access to these opportunities.

- All students can access digital tools and platforms that protect their own and their families' personally identifiable information and receive consistent technical support for safe and secure web navigation.
- All students access digital tools and platforms that recognize and are responsive to their variability as learners, helping historically marginalized populations access an expanded array of educational and career opportunities.

Vision for the Future

As industries continue to rely on technological advances to modernize and web-based applications replace traditional physical resources, the impact of universal connectivity in K–12 reaches far beyond the classroom. As demonstrated in this report, universal connectivity equips students to grow as contributing members of society, civically engaged and informed citizens, and resilient leaders ready to meet emerging challenges as they enter the workforce. With sustained investment from federal and state policymakers, we can create a more robust, inclusive, and innovative economy that benefits all Americans.

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Project Sponsors

Connected Nation's mission is to improve lives by providing innovative solutions that expand the access, adoption, and use of high-speed internet and its related technologies. We believe everyone should have the opportunity to use technology to improve their lives, families, and communities — no matter who they are, where they live, or how they begin. We work at the community, state, and federal levels and with both public and private partners to work toward the common and important goal of expanding access, adoption, and use of broadband to ALL people. Everyone belongs in a Connected Nation.

Funds For Learning is the nation's leading E-rate Funding Compliance Services firm. Our mission is to provide high quality solutions for the needs of E-rate stakeholders. Funds For Learning is committed to the long-term success of the E-rate program. We aim to help all E-rate stakeholders understand and effectively utilize the Universal Service Funding Program for Schools and Libraries and to comply with all of its rules. Through a variety of web-based tools and compliance services, we provide training, answer questions concerning E-rate policies, and interact with USAC on the client's behalf concerning invoice payments, service substitutions, eligibility questions and and other E-rate related issues.

Lightspeed Systems® is dedicated to providing K-12 districts time-saving solutions to create safe, secure, and equitable education, so they focus where it matters most—students and learning. Lightspeed provides cloud-managed solutions: Security & Compliance, Safety & Wellness, and Engagement & Impact, purpose-built for school networks and devices. Headquartered in Austin, Texas, Lightspeed serves more than 20 million students using 11 million devices in 28,000 schools throughout 39 countries.

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T-Mobile US, Inc. is America's supercharged Un-carrier, delivering an advanced 4G LTE and transformative nationwide 5G network that will offer reliable connectivity for all. T-Mobile's customers benefit from its unmatched combination of value and quality, unwavering obsession with offering them the best possible service experience and undisputable drive for disruption that creates competition and innovation in wireless and beyond. Based in Bellevue, WA., T-Mobile provides services through its subsidiaries and operates its flagship brands, T-Mobile and Metro by T-Mobile.

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