Center for Public Education

Educational Equity for Rural Students: Out of the Pandemic, but Still Out of the Loop

A Five-Part Series

Part 2: An Urgent Need to Fix the Digital Divide

AN nsba PUBLICATION

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Why This Study

Nearly 1 in 5 U.S. students attend rural schools. Researchers report that at least half of public schools are rural in 12 states (i.e., Montana, South Dakota, Vermont, North Dakota, Maine, Alaska, Oklahoma, Nebraska, Wyoming, New Hampshire, Iowa and Mississippi) (Showalter et al., 2019). However, "Rural schools are largely left out of research and policy discussions, exacerbating poverty, inequity and isolation" (Lavalley, 2018).

Providing quality education to all rural students is a daunting task and needs the support of policy and research. In 2018, the Center for Public Education (CPE) of the National School Boards Association published a comprehensive report on the U.S. rural K-12 public education, titled "Out of the Loop." Today, the data and research presented in the report are about five years old, but the facts, together with the suggested policies and practices about rural education, are still valid and accurate. After a two-year pandemic, issues such as funding, teacher recruitment and retention, and serving disadvantaged students are becoming more serious in rural school districts.

Based on the 2018 report, the CPE conducted this follow-up, data-driven study to inform policymakers, school leaders, educators, and parents. Our main research goal was to examine educational equity for rural students. According to the Educational Equity Project, educational equity means that each student should receive what they need to develop to their full academic and social potential, regardless of who they are and where they go to school. With this goal in mind, in this series of reports we examined relevant data about the education conditions of rural students, and tried to answer the following research questions:

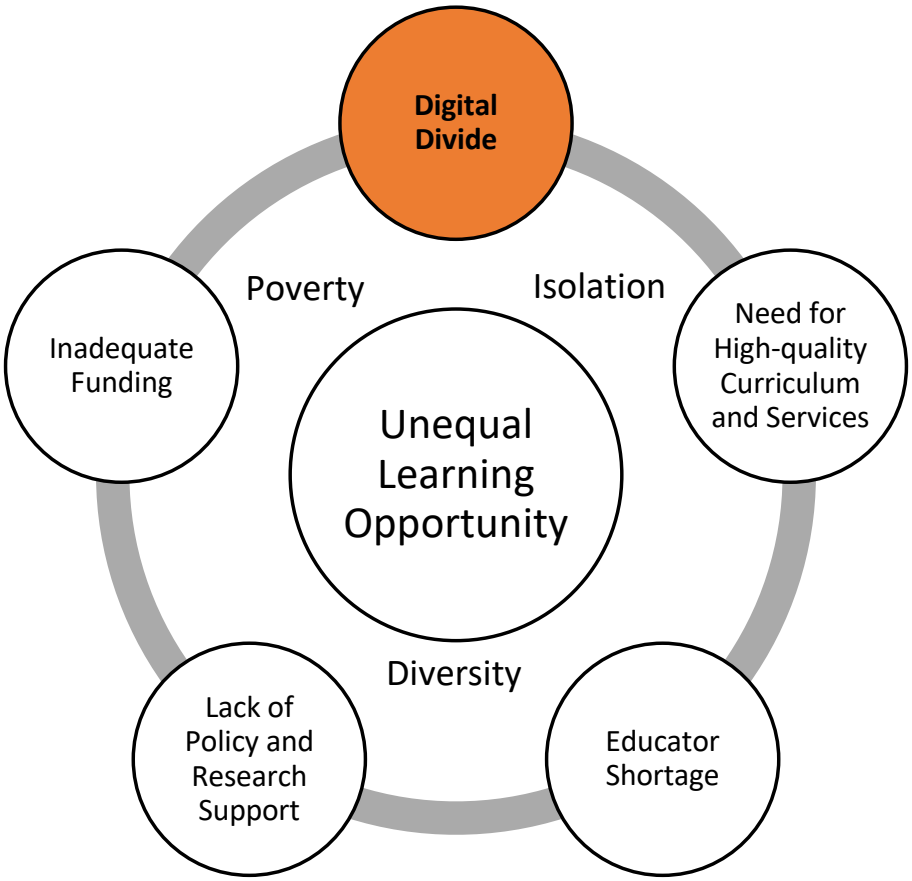
- Why should rural students be actively included in the discussion about educational equity?
- What are some unique challenges of rural education?
- How can policies be more aligned with rural circumstances in terms of providing each student with equal access to all learning opportunities?
- What practices have rural school districts adopted to provide quality education to all students?

The study includes an executive summary and five sections/reports. In this report, we address how the persistent digital divide — often referred to as the homework gap — causes underserved rural students to face more challenges and disadvantages (NSBA, 2020). The COVID-19 pandemic highlighted the urgency of building equal access to internet services in rural areas. To fix the digital divide, we suggest that policymakers look at data about internet accessibility and affordability in rural areas and prioritize specific strategies to close the homework gap caused by the inadequate broadband access of rural students.

- Executive Summary
- Growing Diversity of Rural Students
- **An Urgent Need to Fix the Digital Divide**
- Thinking Broadly and Deeply about Rural Student Achievement and Teacher Pipelines
- School Safety and Mental Health Matter for Rural Students
- Parent Support and Community Culture Are Assets of Rural Schools

An Urgent Need to Fix the Digital Divide

The COVID-19 pandemic highlighted an urgent need to fix the digital divide. Before the pandemic, more than 90% of people living in the U.S. had either moderate-speed (100–999 Megabits per second (Mbps) download speed) or high-speed (at least 1,000 Mbps download speed) broadband internet service needed for high-quality video calls available in their census blocks. By contrast, only 72% of rural residents and only 63% of rural residents in persistent poverty counties had moderate- or high-speed broadband available in their census blocks (USDA, 2021). During the pandemic, rural educators and students faced increased challenges to complete work and school assignments, as they depended on having access to quality internet services at home.



The Digital Divide: Unequal Learning Opportunities

Research shows districts in rural areas have been significantly less likely to expect teachers to provide instruction during the COVID-19 pandemic (Gross and Opalka, 2020).

- Only 27% of rural and small-town school districts expected teachers to provide instruction, compared with over half of urban school districts.
- Only 43% of rural school districts expected teachers to take attendance or check in with their students on a regular basis, compared with 65% of urban districts.
- Approximately 53% of rural school districts required progress monitoring, as opposed to 80% of city districts and 61% of urban districts. Approximately 40% of rural districts provided formal grades of some kind, as opposed to 57% of city districts.

Inadequate broadband infrastructure has become a critical barrier not only to remote learning in rural areas but also to the provision of telehealth services for rural students (Graves et al., 2021). There has been a persistent pattern across the country that rural schools are short of personnel, funding, and other resources to support students with mental health issues, compared with their urban counterparts (Dongen, 2022). For instance, "The rural suicide rate for adolescents is nearly double that of their urban peers over a 15-year period, and that gap appears to be widening" (Nguyen and Bradshaw, 2019). During the pandemic, the digital divide exacerbated the mental health crisis among teenagers (Center for Public Education, 2022). Compared with their urban peers, rural youth face more challenges in accessing the technology and connectivity needed for both remote learning and telehealth.

Researchers (Graves et al., 2021) suggest that policymakers and education leaders should consider geographical disparities and advance technology to ensure health and education equity. In practice, closing the digital divide enables students to utilize rich learning resources on the internet, take online advanced courses/programs, and choose virtual special services they need. In the long run, fixing the digital divide will help close the digital literacy gap, boost rural economies, and mitigate the effects of the teacher shortage and brain drain in rural areas.

How to Define Rural

The term "rural" means different things to different people (U.S. Census Bureau, 2017). In general, rural areas are sparsely populated, far from urban centers, and have low housing density. In the U.S., "97 percent of the country's land mass is rural, but only 19.3 percent of the population lives there" (U.S. Census Bureau, 2017).

Federal agencies define rural slightly differently. According to the Census Bureau, rural is defined as all population, housing, and territory not included within an Urbanized Area (i.e., areas with 50,000 or more people) or Urban Cluster (i.e., areas with at least 2,500 but fewer than 50,000 people). In the 2021 Edition of "Rural America at a Glance" (Dobis et al., 2021), researchers from the U.S. Department of Agriculture (USDA) use nonmetropolitan (nonmetro) counties to refer to rural areas, and the terms "rural" and "nonmetro" are used interchangeably in their report.

In our study, we present data from multiple sources. Like the USDA researchers, we use "rural" and "nonmetro" interchangeably. Since most data used in our report are from the National Center of Educational Statistics (NCES) of the U.S. Department of Education (ED), we mainly use the NCES's definitions for rural areas.

The NCES rural locale assignments rely on the Census Bureau's designation of non-urban territory as rural (Geverdt, 2019). With more details about isolation levels, the NCES rural locale provides fringe, distant, and remote subtypes that differentiate rural locations based on the distance from and size of the nearest urban area. The following are definitions from the NCES:

- **Rural — Fringe: Census-defined rural territory that is less than or equal to 5 miles from an Urbanized Area, as well as rural territory that is less than or equal to 2.5 miles from an Urban Cluster.**
- **Rural — Distant: Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an Urbanized Area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an Urban Cluster.**
- **Rural — Remote: Census-defined rural territory that is more than 25 miles from an Urbanized Area and also more than 10 miles from an Urban Cluster.**

Additionally, we use some regional terms in our study, such as Rural Appalachia and Mississippi Delta, to describe some unique features of rural students and their learning environments. These terms are often fuzzy and contextual, pertaining to culture, community characteristics, and local economy. Some states can be included in more than one region. For instance, Alabama, Kentucky, Mississippi, and Tennessee are in both the Appalachian Region and the Delta Region. We report some data about these rural regions in the hope of helping education leaders to develop new perspectives and strategies to advocate for rural students and rural schools.

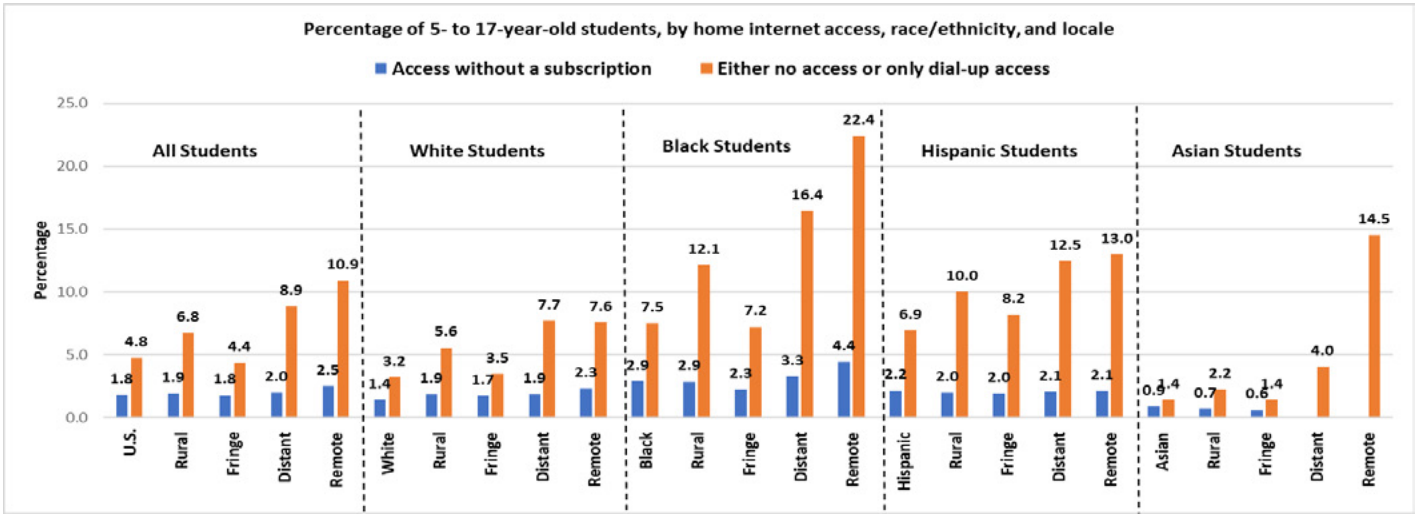
Geographic Isolation and Internet Accessibility

In 2019, nearly 680,000 rural students had no access or low accessibility (only dial-up access) to the internet at home, including 422,000 White students, 111,000 Hispanic, 73,000 Black, and 64,000 American Indian/Alaska Native (AI/AN) students (NCES, 2021). Evidence shows that access to reliable broadband varied significantly across geography (Gravis et al. 2021). Within rural areas, the more remote, the more likely rural students have no access or low accessibility to the internet at home.

As rural communities are diverse, rural students may face unique challenges to internet accessibility. According to a survey conducted on 172 rural and 96 urban school districts in Washington (Graves et al., 2021), most reported barriers for students to access broadband internet at home include living in a geographic area without broadband or smartphone data access or being unable to afford broadband. Several districts reported that some families said that they did not want the internet in their home. Many rural school districts also expressed concerns about low bandwidth or weak broadband connections.

Among rural students, approximately 9% of those living in rural distant areas and 11% of those in rural remote areas had either no access to the internet or low accessibility, as opposed to 7% of students in rural fringes (Figure 2.1). Demographically, the situation was more likely to happen among Black students in rural distant (16%) and rural remote areas (22%), Hispanic students in rural distant (13%) and rural remote areas (13%), and Asian students in rural remote areas (15%). Nationwide, 16% of AN/AI students lacked internet access at home.

Figure 2.1. Percentage of 5- to 17-year-old Rural Students Lacking Home Internet Access, By Race/Ethnicity, and Rural Locale: 2019



Source: U.S. Department of Education, National Center for Education Statistics, Table 218.71 prepared in September 2021.

Affordability and Persistent Poverty

Figure 2.1 also shows that nearly 3% of students in rural remote areas reported that their locations had the available broadband infrastructure, but their homes had no subscription. This situation happened more likely among Black students in rural distant (3.3%) and in rural remote areas (4.4%) than for other racial/ethnic groups. Harrison (2021) states that "Many households in the Black Rural South lack high-speed broadband because it is either unavailable or they lack the financial means to purchase service."

A recent study suggests that the digital divide includes both the availability gap and the affordability gap (Education SuperHighway, 2022). The availability gap refers to households being unconnected because they do not have access to high-speed internet infrastructure. The affordability gap means households with available broadband infrastructure cannot afford to connect. According to the Education SuperHighway (2022)

- Approximately 7.1 million households in the U.S. are unconnected because of a lack of infrastructure or insufficient infrastructure.
- Approximately 18.1 million households across country are estimated in the broadband affordability gap, meaning households with available broadband infrastructure that cannot afford to connect.
- One in five Black households (21%) and one in four Hispanic households (28%) live in communities where 25% or more of the households lack home broadband. Researchers of the study refer to these areas as "America's most unconnected communities," and conclude that the digital divide disproportionately impacts Black and Hispanic Americans.

After decades of public and private investment in broadband infrastructure, affordability is now considered to be the number one barrier in the U.S. to closing the digital divide (EducationSuperHighway, 2022). Researchers estimate that nearly two-thirds of U.S. unconnected households have access to a home broadband connection but are offline primarily because they cannot afford to connect. While more research is needed to analyze this pattern in rural areas, the latest FCC report on internet access services reveals that residents in the poorest and lowest-density areas are the least likely to subscribe to internet services. Consistently, the USDA reports that in 2015-19,

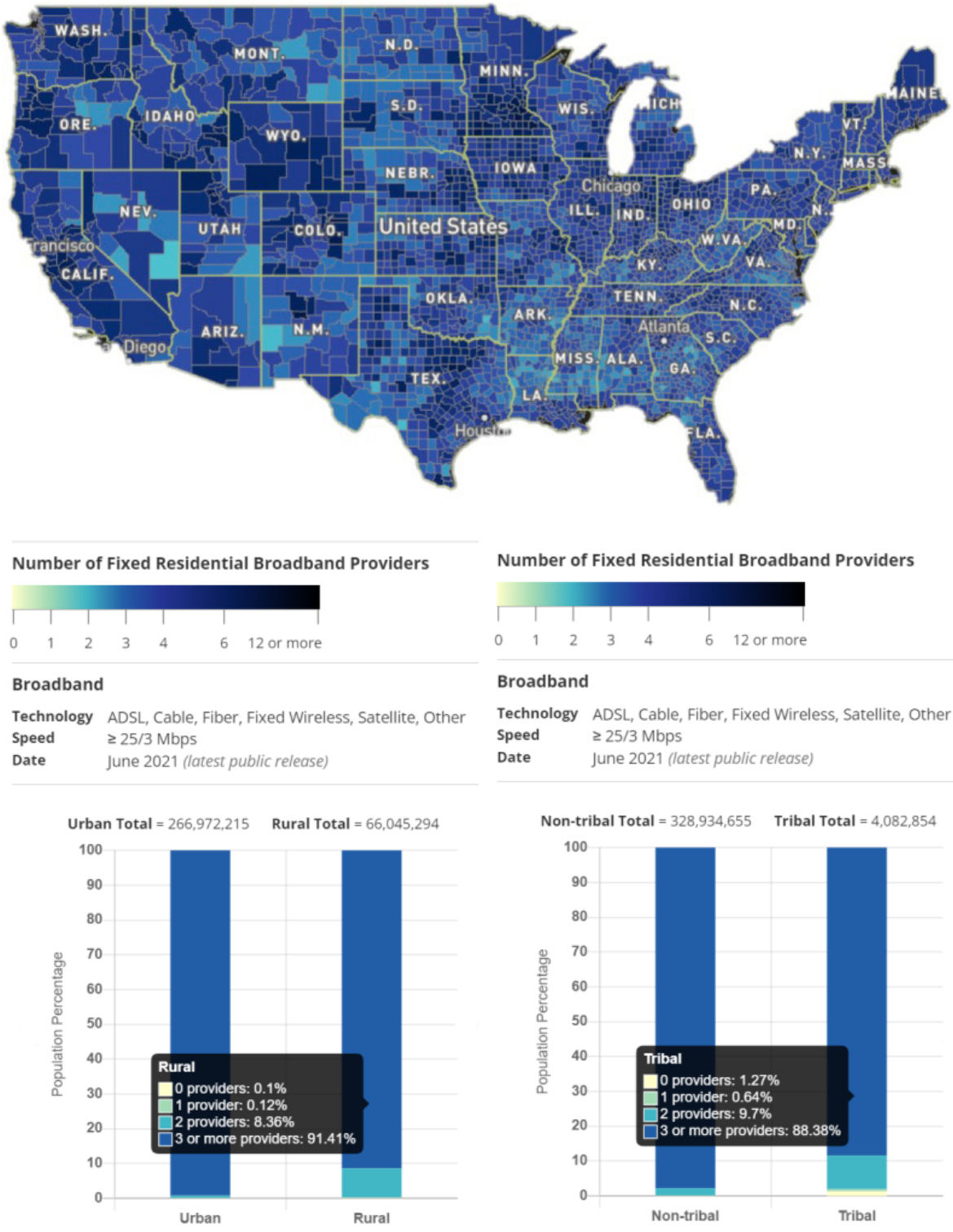
- Rural households were less likely to have internet subscriptions than urban households (75% vs. 84%).
- Rural households in counties with persistent poverty were more likely to report that they only use the internet outside the home, such as going to a public library or coffee shop, compared with those in counties without persistent poverty (32% vs. 20%).

Few Internet Service Providers in Rural Areas

One of the biggest obstacles to availability in rural areas arises from the basic principle of supply and demand. "If a place doesn't have internet access in 2021, there is a reason: generally too few potential customers, too dispersed to serve efficiently" (Casselman, 2021). The lack of access to broadband internet in rural areas has been a problem for years, because "low population density and long distances to existing infrastructure make the upfront cost of infrastructure expansion high for providers" (Marre, 2020). High costs to build "last mile" in remote areas often lead to fewer internet service providers.

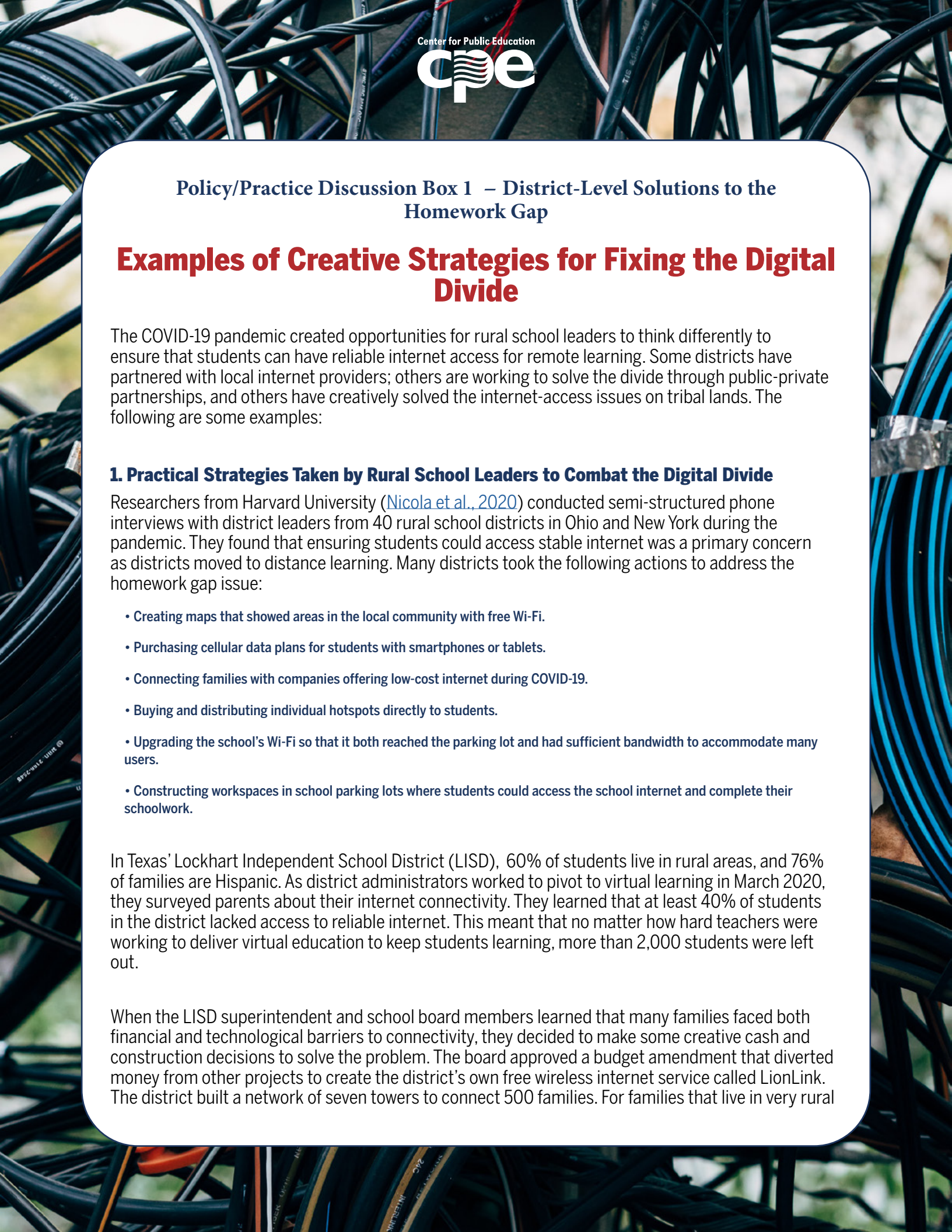
The fact that rural students have no access to internet because of the lack of service providers has become an issue of educational equity. Data from the Federal Communications Commission (FCC) show that few providers offer residential fixed broadband service in the southeastern Coastal Plains with a high percentage of Black students, wide-open Great Plains with a high percentage of Hispanic and American Indian/Alaska Native students, as well as the Appalachian mountains with a high percentage of White students (Figure 2.2).

Figure 2.2. Number of Fixed Residential Broadband Providers in Urban, Rural, and Tribal Areas: 2021



Source: Location Summary | Fixed Broadband Deployment Data | Federal Communications Commission (fcc.gov)

The FCC defines broadband as all technologies and broadband at a speed of at least 25 Mbps downstream/ 3 Mbps upstream, which researchers see as a low-threshold internet speed to carry on educational tasks (Cooper, 2021). Based on this basic broadband standard, 91% of rural areas and 88% of tribal areas had three or more broadband providers in 2021. While the availability situation has greatly improved, still nearly 10% of rural areas and nearly 13% of tribal regions have three or fewer broadband service providers. Approximately 1.3 % of tribal locations have no broadband provider at all. The map consistently shows that rural counties located in the lower Great Plains and western Mountain States, and persistently poor counties in the Deep South and Southwest, had low internet availability.



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Policy/Practice Discussion Box 1 – District-Level Solutions to the Homework Gap

Examples of Creative Strategies for Fixing the Digital Divide

The COVID-19 pandemic created opportunities for rural school leaders to think differently to ensure that students can have reliable internet access for remote learning. Some districts have partnered with local internet providers; others are working to solve the divide through public-private partnerships, and others have creatively solved the internet-access issues on tribal lands. The following are some examples:

1. Practical Strategies Taken by Rural School Leaders to Combat the Digital Divide

Researchers from Harvard University (Nicola et al., 2020) conducted semi-structured phone interviews with district leaders from 40 rural school districts in Ohio and New York during the pandemic. They found that ensuring students could access stable internet was a primary concern as districts moved to distance learning. Many districts took the following actions to address the homework gap issue:

- **Creating maps that showed areas in the local community with free Wi-Fi.**
- **Purchasing cellular data plans for students with smartphones or tablets.**
- **Connecting families with companies offering low-cost internet during COVID-19.**
- **Buying and distributing individual hotspots directly to students.**
- **Upgrading the school's Wi-Fi so that it both reached the parking lot and had sufficient bandwidth to accommodate many users.**
- **Constructing workspaces in school parking lots where students could access the school internet and complete their schoolwork.**

In Texas' Lockhart Independent School District (LISD), 60% of students live in rural areas, and 76% of families are Hispanic. As district administrators worked to pivot to virtual learning in March 2020, they surveyed parents about their internet connectivity. They learned that at least 40% of students in the district lacked access to reliable internet. This meant that no matter how hard teachers were working to deliver virtual education to keep students learning, more than 2,000 students were left out.

When the LISD superintendent and school board members learned that many families faced both financial and technological barriers to connectivity, they decided to make some creative cash and construction decisions to solve the problem. The board approved a budget amendment that diverted money from other projects to create the district's own free wireless internet service called LionLink. The district built a network of seven towers to connect 500 families. For families that live in very rural

areas, in addition to building the towers and installing home routers, crews went to individual homes and installed tall antennas on roofs and in the middle of farmland to pick up the signal from the towers. According to the district, LionLink has helped more than 1,300 students get online and access learning since May 2020.

2. Federal Broadband Funding and Public-Private Partnerships

While the USDA has been investing in rural telecommunications infrastructure for decades, many rural communities still lack access to quality internet connectivity. In 2018, the USDA introduced the ReConnect Program, which has invested over $1 billion to date to expand high-speed broadband infrastructure in unserved rural areas and tribal lands. In October 2022, the Secretary of the USDA announced that two grants totaling $17.7 million would bring broadband internet infrastructure to rural communities in Scott, Jefferson, and Lincoln counties, in Arkansas, through the department's ReConnect Program.

This federal funding is critical to rural school districts in those counties. Among students in the Waldron School District (rural-fringe) in Scott County, 74% are from low-income families, and 14% are eligible for special education. In Jefferson County, most students in the Watson Chapel School District (rural-fringe) are Black (86%) and low income (79%). In Lincoln County, among students in the Star City School District (rural-distant), 68% of students are from low-income families, and one-third are non-White students. As the USDA Secretary remarked, "This really is critically important to the future of rural America, whether it's distance learning opportunities for our students, telemedicine for our hospitals, doctors, market development for our businesses or precision agriculture for our farmers, the internet, high-speed internet, is absolutely essential."

The ReConnect Program is just one of the many federal funds targeting the digital divide. Rural school leaders need knowledge, information, and tools about what funds to use and where to use them. According to Luong (2022), school leaders and rural communities may explore the State & Local Fiscal Recovery Funds (SLFRF) — $350 billion — created through the American Rescue Plan (ARP) Act. This federal funding allows state and local governments to not only increase access to locations without broadband but also upgrade aging infrastructure and address unreliable service or a lack of affordable options with state-of-the-art fiber optic technology.

Another statute, the Infrastructure Investment and Jobs Act (IIJA), created the $42.5 billion federal "Broadband Equity, Access and Deployment (BEAD) Program." The funding dedicated through the BEAD Program requires states to focus on expanding broadband access to unserved and underserved areas. An unserved area is a location with speeds lower than 25 download/3 upload Mbps. An underserved area is a location with speeds lower than 100 download/20 upload Mbps.

To put together the puzzle of federal broadband funding and connect more students and families, school leaders can work closely with both state or local government and the private sector. AT&T offers a new private-public collaboration model for rural broadband (Boone, 2022). AT&T has been working with local officials to bring high-speed fiber (also referred to as fiber optic) broadband

to rural Vanderburgh County in Indiana. Nine months after AT&T signed a contract with the local government, 20,000 homes, farms, and businesses in rural Vanderburgh County received high-speed fiber internet access. According to the American Agriculturist, "The partnership between AT&T and Vanderburgh County, the first of its type in the United States, came about as a result of some forward thinking and creative efforts on the part of local county officials."

3. Connecting Communities on Tribal Lands

Native Americans — American Indians and Alaska Natives (AI/AN) — have been long "left out" from the broadband push for equity (Curi, 2022). In 2019, 35% of indigenous people living on rural, tribal lands had no access to broadband internet, and more than half of rural AI/AN communities did not have fixed broadband coverage (The Bureau of Indian Affairs, 2019). A big obstacle to broadband deployment in AI/AN communities is that a large proportion of AI/AN lands are located on rough terrain in rural areas, and most rural locations are sparser than urban areas, which increases the cost for businesses to serve those areas.

Building a complete fiber broadband connection is a huge challenge for many AI/AN communities. In Montana, many Blackfeet homes shelter multiple generations under one roof. On average, each Blackfeet home with internet access has 17 devices online at once—which adds up to a lot more traffic than the existing reservation network can handle, according to a research article published by the MIT Technology Review. A 2022 broadband availability map shows that 658 locations were served on the Blackfeet Reservation, with 3,235 sites remaining unserved.

Since the beginning of the pandemic, the Blackfeet Tribe has received at least $30 million to upgrade its telecommunications infrastructure. One of the Blackfeet Tribe's first moves was to spend $7.5 million from its Coronavirus Aid, Relief and Economic Security (CARES) Act allocation to take over the telephone and internet exchange in the town of Browning — a central collection of switches and equipment through which all telecommunications traffic on the reservation passes — from a regional telecommunications cooperative. While the Blackfeet are still facing many challenges to moving forward, the tribe has taken a significant step by using the funds from the CARES Act in mid-2020 to purchase the local exchange in a timely fashion. Unfortunately, not every tribe has been able to take as much advantage of these funds (Chaney, 2022).

The Bureau of Indian Affairs points out several barriers to access for Indigenous communities, including a lack of coordination, low adoption rate, and insufficient funding for infrastructure projects. The Department of Commerce's National Telecommunications and Information Administration (NTIA) launched a $980 million program to be distributed to tribal governments for broadband deployment, telehealth, distance learning, broadband affordability, and digital inclusion. As the third tribe in San Diego County to receive funding from the NTIA in 2022, the Rincon Band of Luiseño Indians announced a new collaboration with AT&T on March 2022 to build a fiber network on its tribal lands that will connect more than 400 homes on the reservation to more reliable high-speed, broadband internet service. "This marks one of the first private-public projects on a tribal nation" (The Atlas, 2022).

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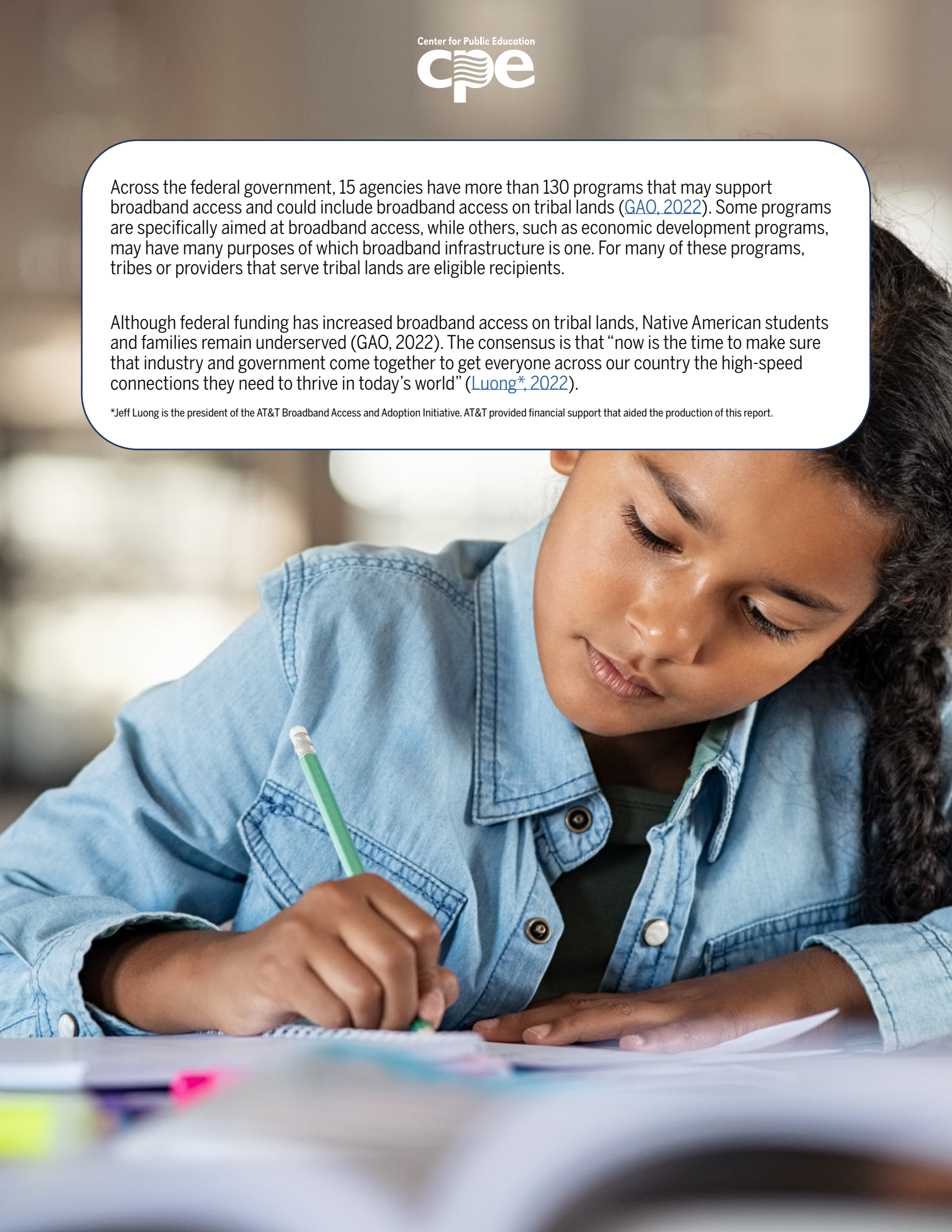
Across the federal government, 15 agencies have more than 130 programs that may support broadband access and could include broadband access on tribal lands (GAO, 2022). Some programs are specifically aimed at broadband access, while others, such as economic development programs, may have many purposes of which broadband infrastructure is one. For many of these programs, tribes or providers that serve tribal lands are eligible recipients.

Although federal funding has increased broadband access on tribal lands, Native American students and families remain underserved (GAO, 2022). The consensus is that "now is the time to make sure that industry and government come together to get everyone across our country the high-speed connections they need to thrive in today's world" (Luong*, 2022).

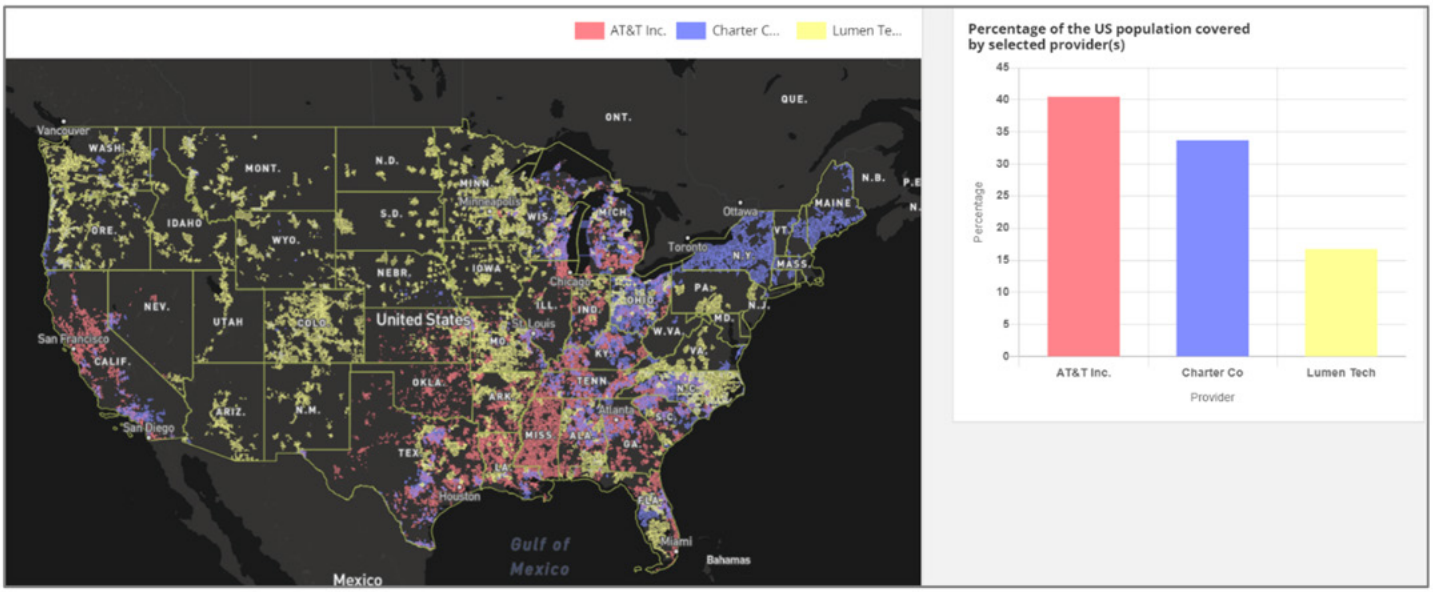
*Jeff Luong is the president of the AT&T Broadband Access and Adoption Initiative. AT&T provided financial support that aided the production of this report.



A Need for Better Internet Services

Basic economic theory demonstrates that when companies have to compete for customers, it leads to lower prices, higher quality goods, and more innovation (Boushey and Knudsen, 2021). When few broadband providers can be found in rural areas, students and families may have little to no option to choose desired internet services. For example, both fiber optic and cable internet are much faster than digital subscriber line (DSL) (Gerencer, 2020; Holslin, 2022). FCC data show that among three of the largest U.S. fiber/cable providers, AT&T serves 40% of the U.S. population, Charter Communications 34%, and Lumen 17%, but none of them provides broadband service in Alaska, and most places in the Great Plains are served by only one of the three providers (Figure 2.3).

Figure 2.3. Broadband Service Provider Coverage Overlap and Population Coverage



Source: Provider Detail | Fixed Broadband Deployment Data | Federal Communications Commission (fcc.gov)

Media survey data suggest that not all highly ranked, consumer-favored internet providers are available in rural areas (Table 2.1). According to Forbes (2022), fiber internet is considered the best internet for rural areas. However, so far, satellite internet has been the only option in many rural areas due to unavailable infrastructure to support fiber or cable internet. With the current technology, users of satellite internet or DSL often suffer from lags and slower speeds because signals travel long distances (Gerhardt and Allen, 2022). As the Pew Research Center(2021) points out, even though rural areas are more wired today than in the past, current infrastructure does not support consistently dependable broadband access in many rural areas.

Table 2.1. Best Internet Providers Ranked by Forbes: October 2022

Internet Provider	Lowest Price Plan Available	Customer Rating	States Available	Forbes: 10 Best Internet Providers of 2022 (√)	Forbes: 5 Best Rural Internet Providers of 2022 (√)
AT&T Internet	$35.00	Great	21	✓ Best Overall	Provides internet service to rural areas with its fixed wireless internet via an outdoor antenna and indoor Wi-Fi gateway router. Basic plan starts at $59.99 a month and offers a bundled package with Directv for $134.98 a month.
T-Mobile Home Internet	$50.00	Great	49	✓ Best Mobile Internet	✓ Best Mobile Internet
Cox Communications	$29.99	Great	18	✓ Best Company for Bundles	
CenturyLink	$50.00	Great	36	✓ Best No Contract	✓ Best DSL Option
Comcast Xfinity	$20.00	Great	40	✓ Best Customer Reviews	✓ Best Overall
Verizon Fios	$39.99	Great	9	✓	
Google Fiber	$70.00	Excellent	15	✓	
HughesNet	$59.99	Great	50	✓	✓ Best Nationwide Coverage
Windstream	$37.00	Great	50	✓	
Charter Spectrum	$19.00	Okay	17	✓	Plans start at $49.99 with available speeds of 100 Mbps to 1 GB through hybrid-fiber coaxial connections. Spectrum serves 41 states.
Viasat	$39.99	Great	50		✓ Best Satellite Option

Source: Best Internet Options For Rural Areas Of October 2022 – Forbes Home; Best Internet Providers Of January 2023 – Forbes Home

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Policy/Practice Discussion Box 2 – The E-rate Program

Policy Alignment with Rural Circumstances

The E-rate program of the Federal Communications Commission (FCC) makes telecommunications and information services more affordable for schools and libraries. With funding from the Universal Service Fund, E-rate provides discounts for telecommunications, internet access, and internal connections to eligible schools and libraries. Since 1997, the E-rate program has been providing billions of dollars every year to support internet access and computer networking in schools and libraries that have affordability issues. Nearly every school and library in America benefits from this program.

Thanks to this federal program, the concern over insufficient internet access is decreasing, and the digital divide shows a closing trend (Harrington, 2022). The 2022 E-rate Trends Report published data from a survey of more than 2,000 applicants — nearly 10% of the total number of E-rate applicants nationwide; two-thirds of the respondents were rural applicants. The survey responses highlight the program's successes:

- **"As a rural school district, we don't have the resources we would need to pay for these services if the discounts were not in place. Thank you for keeping E-rate alive and well."**
- **"We would not have nearly the robust network that we do if it weren't for E-rate funding. It's a lifesaver in small, rural areas!"**
- **"The E-rate program is critical to the needs of our rural district. Without this program, we simply would not have the funding to maintain a relevant and adequate network for our students and staff."**

Availability and affordability are big issues for rural communities to access quality internet. Seventy-eight percent of respondents agree that insufficient internet access to the home of students or library patrons is a significant issue in their communities. Many rural respondents expressed frustration about the lack of broadband service providers:

- **"Having a strong network through E-rate is great. However, the cost to secure it from the current threat landscape is next to impossible. Especially for a rural, low-wealth district."**
- **"Small rural communities that have moderate incomes cannot afford the high-speed options when broadband is not generally available in those areas."**
- **"Offsite Wi-Fi accessibility would be the most significant offering [that the] state could add for my library and community. Our rural area has a large proportion of residents who either cannot afford Internet access or have no broadband access available to their home."**

Fewer broadband providers may lead to lower quality of services. One of the biggest obstacles to availability in rural areas arises from the basic principle of supply and demand. This situation has complicated the E-rate required bidding process. Some rural applicants appreciate the E-rate program but seem trapped in the seemingly-meaningless bidding process:

- **"We are rural, and we only have one service provider available (one who will offer what I'm asking for) so having online bids will not help me."**
- **"I think meeting the goal of improving Internet service prices through bidding is difficult because in many rural areas there are only one or two Internet providers."**
- **"If E-rate requires bids to be submitted through the portal, we would like stop applying. We are in a very rural, frontier, area and have limited vendors. This would place an undue burden on this library. Overall, the E-rate funding is vital to providing Internet to our rural communities."**
- **"I am [in] a rural school district located on a Native American reservation. Our telecom provider runs fiber to our town. Unfortunately, the service provider is extremely unreliable and cannot be used. We have to use another provider that costs a lot more but that provides stellar reliable service. My concern in regard of bidding, is having the ability to automatically remove such unreliable vendors. Currently, in my RFPs [Request for Proposal] I have a lot of language regarding the service quality and many questions/requirements in order to keep-out providers who are not serious and financially stable. If USAC set the RFP portal system, I think it is important that we have options to ensure that we are selecting a vendor that is really capable in delivering the service for our area."**

Ninety-four percent of respondents agree that E-rate funding is vital to the internet connectivity of schools and communities. Many challenges facing rural schools and communities are caused by the one-size-fits-all bidding process. Some rural respondents pointed out that "Competitive bidding is probably great for urban areas but in rural areas it just causes a lot of extra hoops when we only have one company that can service our area. We get flooded with bids from companies that can't even provide service to us to begin with."

The E-rate program is one example of how the existing policies need more alignment with rural circumstances. As we mentioned in the previous section, rural students are increasingly diverse. Diversity comes in diverse ways, and policymakers should develop strong and specific policies to meet the needs of all students.

Digital Literacy of Rural Students

So far, we have shown data about how poverty and the lack of infrastructure are relevant to the digital divide between rural and nonrural areas (Dobis et al., 2021; Luong, 2021). The gaps in internet subscription, regardless of availability or affordability issues, suggest that rural students, particularly in persistent poverty counties, have additional obstacles to equal learning opportunities. The U.S. Department of Education (ED, 2022) points out that "The quality and type of home broadband access has shown to directly impact learner school participation, performance outcomes, and digital literacy."

Providing all rural students with equal access to the internet is just the first step to fixing the digital divide. Although the solution to the digital divide should be centered on providing more access — through increased digital infrastructure and access to devices — access alone cannot close the digital divide (Brisson-Boivin and McAleese, 2021). As the Canadian Internet Registration Authority noted, "providing better access is one thing; giving people the tools and resources they need to become digitally literate (and safe online) is another issue altogether."

School leaders believe that closing the homework gap is essential to provide every student with equal learning/training opportunities and prepare all students for their future careers (NSBA, 2020). While the internet cannot replace teachers or in-person learning, the virtual connection can enrich students' learning environments and empower students with a well-rounded education. Importantly, using information technology to solve problems has become essential for living and working in the 21st century. Access to the internet and networked devices is just the starting point for helping rural students to develop digital literacy skills.

Digital literacy refers to the skills associated with using technology to enable users to find, evaluate, organize, create, and communicate information (ED, 2022). The United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2011) describes digital literacy as a set of basic skills required for working with digital media, information processing, and retrieval (Table 2.2). Digital Literacy can improve students' employability and serve as a catalyst for students to become lifelong learners (Chetty et al., 2020).

Table 2.2. Simplified Representation of the Digital Literacy Dimensions and Perspectives

Dimension	Perspective		
	Cognitive	Technical	Ethical
Information ***(Digital Content)***	Synthesis	Access, Usage	Appropriate Usage
Computer ***(Hardware and Software)***	Evaluate	Usage	Appropriate Usage
Media ***(Text, Sound, Image, Video, Social)***	Critique, Create	Navigation	Assess Truthfulness
Communication ***(Non-linear Interaction)***	Critique, Create	Develop and Use Content	Appropriate Usage
Technology ***(Tools for Life Situations)***	Invent and Evaluate Tools	Usage	Appropriate Usage

Source: Bridging the Digital Divide: Measuring Digital Literacy (g20-insights.org)

Simply put, digital learning is infused into school curricula. Acquiring digital literacy will empower students of all abilities and zip codes to take all learning opportunities and take responsibility in pursuing their education. Appropriate use of digital resources can make learning personalized, assist students in mastering targeted skills and competencies, and protect their privacy. Unfortunately, few studies examine the trajectory of how rural students develop digital literacy. The U.S. Department of Education provides useful resources for parents and educators to teach digital literacy:

- "School Leader Digital Learning Guide," a resource to help school leaders understand digital learning principles and practices. This guide enables school leaders and educators to plan and implement digital literacy lessons in everyday classrooms.
- "Parent and Family Digital Learning Guide," a resource to inform parents or caregivers how to monitor their child's progress as they access and use technology for learning.
- "Teacher Digital Learning Guide," a guide designed to provide important resources and recommendations to support teacher implementation of digital learning.

Nonprofit educational organizations and information technology companies often provide innovative, collaborative solutions to the digital divide from connection and devices to digital literacy. The following are some examples:

- In a report published by Common Sense Media, researchers (Chandra et al., 2020) recommend three strategic steps for states and school districts to close the digital divide. First, education leaders should conduct a needs assessment to determine which students need connectivity and devices and where they live. Second, policymakers need to determine which devices and connectivity options are desirable and available and how to distribute them. Lastly, school leaders must find the money to pay for it all. The study highlights some successful cases of school districts and shows how the three key steps worked in the effort to close the K–12 digital divide during the pandemic.
- Successful businesses often incorporate social responsibility into their missions, which is a strength of the American economic and social system (Murillo and Martinek, 2009). An example is AT&T Connected Learning℠ , a part of the company's $2 billion commitment to help bridge the digital divide and remove barriers to affordability, access, and adoption of technology. To help more students have access to the technology resources they need to learn, the company is working with nonprofits to get devices into the hands of students and opening AT&T Connected Learning Centers around the country to provide underserved students and families with free access to the internet, computers, and educational resources.

Digital literacy education is a way to guide students toward being responsible internet users. According to PowerSchool, a leading provider of cloud-based software in K-12 education, incorporating digital literacy in the classroom enables students to discern quality sources, understand authorship rules, and evaluate the credibility of online content. As technology rapidly moves K-12 education forward, rural students have increasing opportunities to access online courses and resources to meet their unique needs. Yet, it is digital literacy that helps students to be safe online and keep up in the classroom and beyond.

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Policy/Practice Discussion Box 3 – Recent Congressional Bills on the Digital Divide

Recent Congressional Bills to Support Rural Education

Many U.S. Senators and Members of the House of Representatives introduced bills to support rural students and rural schools between 2021 and 2022. Some bills focus on prioritizing broadband programs in rural areas. Some target solutions regarding expanding STEM (science, technology, engineering, and mathematics, including computer science) programs for rural students, investing in the rural teacher pipeline, improving the health conditions of rural communities, and incentivizing research on rural education. The following are some examples:

- Connected Rural Schools Act, introduced by Sen. Catherine Cortez Masto (D-NV) on March 10, 2021. The bill authorizes counties to use funds from the Secure Rural Schools Program to provide or expand access to (1) broadband services at local schools or (2) technology and connectivity necessary for students to use digital learning tools outside of a local school campus.

- Broadband for Rural America Act, introduced by Rep. Glenn Thompson (R-PA) on May 20, 2021. The bill modifies and consolidates Department of Agriculture (USDA) programs for expanding broadband internet in rural areas. Specifically, the bill modifies a program that provides grants, loans, and loan guarantees to support broadband expansion in rural areas. Modifications include revising the criteria used to prioritize applications and projects and changing the name of the program to ReConnect Rural Broadband Program.

- Rural STEM Education Research Act, passed by the U.S. House of Representatives on May 18, 2021. Rep. Frank D. Lucas (R-OK) introduced the legislation in January 2021. It specifies federal scientific research and development efforts toward STEM workforce development and rural STEM education. Additionally, the bill emphasizes that the National Institute of Standards and Technology (NIST) must award prizes to stimulate research and development of creative technologies to deploy affordable and reliable broadband connectivity to underserved rural communities. NIST may grant no more than $5 million in prizes.

- Sen. Roger F. Wicker (R-MS) reintroduced the Rural STEM Education Act in the U.S. Senate on April 27, 2021. Like the House-passed version, the bill directs the National Science Foundation (NSF) to support research regarding STEM education in rural schools. It also requires NIST to award prizes to stimulate research and development of creative technologies to deploy affordable and reliable broadband connectivity to unserved rural communities.

- Rural Education Investment Act, introduced by Rep. Mike Bost (R-IL) on March 16, 2021. The bill requires the Department of Education (ED) to determine annually the percentage of students in kindergarten through grade 12 who are served by local educational agencies (LEAs) located in rural areas. ED must then reserve at least an equal percentage of Teacher Quality Partnership grants for partnerships with such LEAs.

In summary, quality internet connectivity for rural communities should be a key public policy goal. Access to telecommunication infrastructure can bring to rural communities both economic and educational opportunities (Sager and Tate, 2004). While rural broadband access has made notable progress, rural areas still lag behind their urban and suburban counterparts. Closing the digital divide is certainly a way to improve the rural economy and quality of life (Lee, 2019), but beyond that, bridging the economic gap between rural and non-rural areas is a long-term solution to attracting teachers and adding advanced curricula for rural students.

Key Findings

Rural students were twice as likely as urban students to report a lack of adequate technology to complete their coursework during the pandemic. The pandemic exacerbated the digital divide between rural and non-rural areas and highlighted the urgent need to fix this educational equity issue.

1. Within rural areas, the more remote, the more likely rural students have no access or low accessibility (i.e., only dial-up access) to the internet at home. Among rural students, approximately 9% of those who live in rural distant areas and 11% of those in rural remote areas had either no access to the internet or low accessibility, as opposed to 7% of students in rural fringes. Demographically, the situation was more likely to happen among Black students in rural distant (16%) and rural remote areas (22%), Hispanic students in rural distant (13%) and rural remote areas (13%), and Asian students in rural remote areas (15%).
2. In 2021, 91% of rural areas and 88% of tribal areas had three or more broadband providers. While the availability situation has greatly improved, still nearly 10% of rural areas and nearly 13% of tribal regions have three or fewer broadband service providers. While we may certainly celebrate that 98.7% of tribal areas have at least one broadband provider, we should not forget the 1.3% of tribal locations without any broadband provider. In general, rural counties located in the lower Great Plains and western Mountain States, and persistently poor counties in the Deep South and Southwest, had low internet availability.
3. Researchers estimate that nearly two-thirds of the U.S. unconnected households have access to a home broadband connection but are offline primarily because they cannot afford to connect. In 2015-19, rural households were less likely to have internet subscriptions than urban households (75% vs. 84%). Rural households in counties with persistent poverty were more likely to report that they only use the internet outside the home, such as going to a public library or coffee shop, compared with those in counties without persistent poverty (32% vs. 20%).
4. Providing all rural students with equal access to the internet is just the first step to fix the digital divide. As using information technology to solve problems has become a must for living and working in the 21st century, policymakers and school leaders should consider the long-term impact of fixing the digital divide. Access to the internet and networked devices is just the starting point for helping rural students to develop essential digital literacy skills. Unfortunately, few studies examine the trajectory of how rural students develop digital literacy.

Technical Notes

In this report, we used multiple data sources to conduct a comprehensive and thorough research review. Most of the data are selected from the recently published tables prepared by the National Center for Educational Statistics (NCES), federal reports published by the Census Bureau, the U.S. Department of Agriculture (USDA), and the Federal Communications Commission (FCC), as well as some academic research papers. We provide links to data sources for readers who are interested in the methodology of our data collection and estimation.

While data used in this study are from reliable sources, our research has limitations. First, in the section "How to Define Rural," we explain how federal agencies define rural. It should be noted that in some studies, rural may be combined with small towns. For example, in a study about rural Michigan (Arsen et al., 2022), researchers combine all districts that NCES classifies as "rural" or "town" as rural, while defining "nonrural" as NCES's urban and suburban districts. They believe that their definition of "rural" is more reflective of the shared challenges experienced by the "rural" districts and, importantly, is consistent with the perceptions of people who live in rural places. If we cite such studies, we remind readers of the difference.

Second, in many parts of our study, we report both the count of students and the percentage of students by group. When comparing populations that have a large difference in size, reporting percentages or counts only can lead to ambiguous and even misleading interpretations. For example, 0.3% increase in students with disabilities represents more than 20,000 students; 0.8% increase in English language learners means more than half a million students. For students who attend rural schools with more than 75% of students eligible for free or reduced-price lunch, 8.2% of White students means approximately 546,000 students, while 37.6% of Black students represents nearly 339,000 students. For students who attend rural schools where 50.1% to 75% of students are eligible for free or reduced-price lunch, 28.2% of White students equals nearly 2 million students, whereas 29.3% of Black students represents a quarter of a million students. Both percentages and discrete counts (figures) matter.

Lastly, while we use different algorithms when searching qualitative data and cite various examples in our study, it does not necessarily mean that we endorse the product, researcher, or organization cited. The views of cited research do not necessarily represent our views. Our purpose in this study is to provide a wide range of data and information for readers to examine and consider. We encourage our readers to exercise their own sound judgement when assessing and using the information we provide in the study.

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The National School Boards Association (NSBA) believes that accurate, objective information is essential to building support for public schools and creating effective programs to prepare all students for success. As NSBA's research branch, the Center for Public Education (CPE) provides objective and timely information about public education and its importance to the well-being of our nation. Launched in 2006, CPE emerged from discussions between NSBA and its member state school boards associations about how to inform the public about the successes and challenges of public education. To serve a wide range of audiences, including parents, teachers, and school leaders, CPE offers research, data, and analysis on current education issues and explores ways to improve student achievement and engage support for public schools.

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Founded in 1940, the National School Boards Association (NSBA) is a non-profit organization representing state associations of school boards and the Board of Education of the U.S. Virgin Islands. Through its member state associations that represent locally elected school board officials serving millions of public school students, NSBA advocates for equity and excellence in public education through school board leadership. We believe that public education is a civil right necessary to the dignity and freedom of the American people and that each child, regardless of their disability, ethnicity, socio-economic status, or citizenship, deserves equitable access to an education that maximizes their individual potential.

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