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DigitalEquity

Supporting Students & Families in Out-of-School Learning

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February 2016

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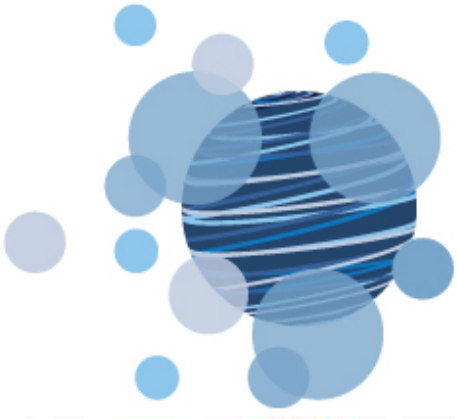


Digital Equity:

Supporting Students & Families in Out-of-School Learning

"Access to high-speed broadband is no longer a luxury; it is a necessity for American families, businesses, and consumers. Affordable, reliable access to high-speed broadband is critical to U.S. economic growth and competitiveness. High-speed broadband enables Americans to use the Internet in new ways, expands access to health services and education, increases the productivity of businesses, and drives innovation throughout the digital ecosystem."

—President Barack Obama

Executive Summary

There's a fast-developing problem with learning today. While nearly two decades of improved Internet access for schools (including billions of federal E-rate dollars) is largely closing what remains of the so-called digital divide, the ubiquity of more recent mobile technologies has now opened wide a new 'homework gap' into which lower-income students too often fall. As a large part of education still happens after school lets out, students with reliable, robust Internet access and task-appropriate devices seamlessly stay connected to classwork, assignments, teachers and all manner of necessary online resources for work and learning they accomplish at home. Meanwhile, those without a meaningful home-to-school or student-to-resources connection in their home environments face challenges that make for a very uneven playing field. And the gap extends beyond homework; parents, too, stand to lose out; being connected is tantamount to being fully informed of their child's academic performance. Such access and opportunity can't in fairness be seen as a luxury afforded only for affluent or better-connected communities when, in today's reality, Internet access on appropriate devices with a sufficient amount of bandwidth are basic and essential tools for learning and participation in our system.

This toolkit offers historic contextual background, describes the 'homework gap', addresses broader implications of household connectivity, and details four **first steps** school districts can take right now:

1. **Survey**
2. **Engage your community**
3. **Ensure sustainability through community assets**
4. **Consider outside-of-the-box solutions**

We also present six ***approaches*** that are enabling some school districts to strengthen their leadership and spark innovation in pursuing digital equity in their communities:

1. ***Partnering with local businesses on Wi-Fi access for learning***
2. ***Making the most of existing school district assets***
3. ***Seeking mobile hotspot programs and/or affordable LTE***
4. ***Taking advantage of special broadband offerings***
5. ***Repurposing educational spectrum***
6. ***Creating a mesh network***

Innovative leaders in school districts nationwide, with help from business and community groups, are rising above fiscal constraints to ensure digital equity for their students. This toolkit provides thoughtful strategies, inspiring case studies and workable survey templates to implement such digital equity in any locale. Indeed, it doesn't require much contemplation to see the moral imperative and societal benefit in making such digital equity a reality. The good news is, with help from this toolkit, it isn't impossible, but it does require an intentional approach. Welcome to the civil rights issue of today's digital era.

Introduction

Goal

To provide school districts and their communities with the information necessary to support students and families in achieving equity in out-of-school learning.

Background

Eighteen years ago, the E-rate program was created to connect all classrooms to the Internet. E-rate's initial mission of providing a basic connection to the Internet in every classroom has largely been accomplished.

However, as noted in CoSN's 2014 Infrastructure Survey, school districts continue to face significant broadband and technology infrastructure challenges. In December 2014, citing this and other data, the Federal Communications Commission (FCC) voted to increase funding available through the E-rate program by 60 percent. The result is that an additional $1.5 billion is available annually for the next five years to improve broadband connectivity and Wi-Fi *in U.S. classrooms* for a total of nearly $4 billion yearly.

While there are very exciting gains to be made in on-campus connectivity, failure to address Internet access *outside* of school will prevent districts from maximizing student growth and development. It could also deepen the digital divide for children who lack robust access at home. It is imperative that we move beyond the classroom and capture the power of the Internet to enable anywhere, anytime learning.

Alarmingly, over 75 percent of school district technology leaders report that they have no strategies to address off-campus access – a serious problem for students from low-income families, according to our survey.

In spite of resource constraints faced by school districts, now is the right moment to broaden our horizons from simply focusing on at-school access to enable anywhere, anytime learning. To do this education leaders will need thoughtful, intentional strategies and policies that decrease inequities in digital learning.

The "Homework Gap" Problem

In 2009, the FCC's Broadband Task Force reported that about 65 percent of students used the Internet at home to complete their homework, a statistic that has likely increased given the growing trends of digital learning. The Task Force also found that approximately 70 percent of teachers assign homework requiring access to broadband, another statistic that has likely increased as schools move to more digital learning. While discussions have framed this as a 'homework' gap, in reality it's a widening chasm into which parents/guardians also fall.

Nearly 50 percent of all students said they were unable to complete a homework assignment because they lacked access to the Internet or a computer.

School notices, calendars, news, information, and updates are sent or available in electronic form with an assumption of a home connection. More importantly, the goal isn't to enable just homework, but anytime learning, bolstered through parental support and awareness, and all of this requires both inside school and outside school access.

The Pew Research Center in April 2015 found that 82.5 percent of American households with school-age children have broadband access in the home. This is approximately 9 percentage points higher than the broadband adoption rate across all households. Yet beyond that positive overall statistic, there remain 5 million households with school-age children which lack broadband in the home. Students in these households experience what is being labeled the 'homework gap'. The educational challenge is, of course beyond simply homework, and must also involve new opportunities for learning inside and outside the class, as well as ways to communicate with families.

Low-income households comprise a disproportionate share of this 5 million without broadband access. Low-income homes with children are *four times more likely* to lack broadband than middle or high income families. Likewise, low-income black and Hispanic families with children trail comparable white households with children by about 10 percentage points for home broadband access.

A 2015 survey by the Hispanic Heritage Foundation provides additional information about the extent of the problem.

- Nearly 80 percent of Hispanic students who did not have regular access to a computer at home used their smartphones to access the Internet.

- Nearly 50 percent of all students said they were unable to complete a homework assignment because they lacked access to the Internet or a computer. Hispanic students reported this more frequently.

- Overall, 42 percent of students surveyed believed they received a lower grade on an assignment because they lacked access to the Internet. Hispanic students were most likely to feel they had received a lower grade due to this lack of access.

Teachers across the country have become increasingly attuned to the impact that the homework gap has on students' educational achievement. According to a 2015 report by the Bill & Melinda Gates Foundation, 42 percent of teachers indicate that their students lack sufficient access to technology outside of the classroom. A 2014 report by the Alliance for Excellent Education and the Stanford Center for Opportunity Policy in Education found that teachers in high-poverty schools were more than twice as likely to say that their students' lack of access to technology outside of school posed a challenge in their classrooms. Only 3 percent of teachers in high-poverty schools said that their students had the digital tools necessary to complete homework assignments while at home, compared to 52 percent of teachers in more affluent schools.

The under-connection of low-income families is a real issue. A holistic approach will ensure that school-aged children aren't reduced to little or no access.

In addition to reducing digital inequities, there are other reasons why broadband access and adoption are important to low-income families. A survey conducted by the Miami-Dade School District following implementation of its $3.5 million grant initiative which provided laptops and an Internet connection for use at school and home showed that 90 percent of parents found having the computer and home access enabled them to keep more informed about their child's academic performance.

Similarly, Tech Goes Home (TGH), a digital equity initiative founded in Boston and now operating in several additional cities across the country, found that participation in their digital access program has had positive impacts beyond learning digital skills. Nearly 70 percent of families in TGH school-based programming indicated that this was the first time that they had participated in an activity at their child's school. Ninety-five percent of these parents/guardians plan to take part in future activities at their child's school or at the community institution. Home trainers say the program improved their relationship with their families and participants.

Household Connectivity Big Picture

A digital equity solution that provides a student with precisely what he or she needs in order to complete homework may not implicitly advance digital equity for that student.

Stepping back for a big picture view, many students come from households in which others also depend upon robust connectivity to fully engage in work and life, and to maintain strong home-to-school connections. A parent, an older sibling, or other family member may be using shared connectivity or even a shared device.

If you were to simply ask lower-income families if they had Wi-Fi and a device, the majority would say yes. However, the Cooney Center, a team of researchers funded by the Bill and Melinda Gates Foundation, who undertook just such a mission, reported that "access to the Internet and digital devices is no longer a simple yes/no question. Whether families have consistent quality connections and the capabilities to make the most of being connected is becoming just as important." Further, according to their first-of-its-kind nationally representative survey of 1,191 low- and moderate-income parents with school-aged children (ages 6 to 13), among families who have home Internet access, half (52%) say their access is too slow, one quarter (26%) say too many people share the same computer, and one fifth (20%) say their Internet has been cut off in the last year due to lack of payment.

The under-connection of low-income families, then, is a real issue, and while it may not be the purview of the school district to accommodate for all family members in a household, a more holistic approach will ensure that the school-aged children that school district *does* serve aren't reduced to little or no access due to the circumstances of their home environment, including some of the issues mentioned above. Whatever they may be, these types of issues and challenges will reveal themselves in results from a well-planned and well-executed strategy to gather one's own local information on what exactly is the case.

These surveys are valuable tools for districts to understand and track progress in addressing digital equity challenges and identify emerging issues.

2. First Steps

Step 1: Survey, Survey, Survey

A key first step in addressing digital equity within your school district is to identify the scope of the problem. In other words, it is important for district and school leadership to be able to fully articulate the context for digital learning that their students engage in outside of school. Teachers and school administrators may be generally aware of digital equity challenges within the district and may even know specific students who have limited access to the Internet outside of the classroom. It is crucial , however, for districts to broaden this awareness with survey data. The U.S. Census Bureau began asking about computer and Internet use in the 2013 American Community Survey (ACS). This new set of digital equity indicators collected at the community level may provide a useful starting point for conversations.

CoSN and the Friday Institute for Educational Innovation at North Carolina State University have created a set of recommended student and parent survey questions (see Appendix 1) available to districts. These surveys are valuable tools for districts to understand and track progress in addressing digital equity challenges and identify emerging issues.

Suggested categories of questions to include in a survey are:

Devices. What types of devices do students use to connect to the Internet? Which of these do they use at home? Which of these are suitable for completion of homework? How many family members shared each device in the home?

Places. What places other than home do students spend time outside of school hours? Which of these places have Internet connections that students can use? Are there places where it would be appropriate to add Wi-Fi connectivity or look for affordable LTE solutions for student use?

Speed. What is the speed of connection that students need to engage in anywhere, anytime learning? Do they have access to this speed of connection in their home and in other places in the community where they do schoolwork?

Another example is the Grundy Center Community Schools in Iowa who are an excellent model of how districts can assess students' out-of-school technology environments. Their survey was particularly comprehensive and also examined the out-of-school connectivity status of teachers. Collecting this data allowed the district to understand the nature of out-of-school connectivity experienced by students within the district's elementary school, middle school, and high school. This survey is a component of their district-wide Technology Plan implemented to direct in-school and out-of-school technology strategy for 2013-2019.

School leaders also need to identify which students face connectivity challenges outside of school. This level of data will enable school districts and

students' parents/guardians to work together in securing the tools that students need for anywhere, anytime learning.

Step 2: Engage Your Community

Schools are in a unique position to engage the broader community in creating and enacting digital equity strategies. Though school districts have the responsibility to ensure digital equity for their students to compete in today's digital world, the entire community shares an interest in advancing digital equity for all.

Enlisting other institutions that make up the fabric of a community will broaden the array of perspectives, ideas, and resources needed to address digital equity now and put sustainable solutions in place for the future.

The Open Technology Institute provides excellent guidance on the process of engaging partners across the community in digital equity initiatives. OTI has found that the following organizations play a critical role in the long-term sustainability of neighborhood technology investments:

- Churches and faith-based social service institutions
- Community-based organizations, community centers
- Libraries
- Schools, educational and workforce programs, including GED prep
- Social service facilities, including municipal aid and public/low-income housing
- Cooperatives (food, child care, etc.)
- Hackerspaces / makerspaces
- Major bandwidth buyers including hospitals, tech firms, and universities
- Commercial Internet service providers (especially local or independent firms)
- Middle-mile or "bulk" bandwidth providers

OTI recommends assessment of these institutions' readiness to engage with broadband access and adoption work, including existing bandwidth resources, as well as their capacity and interest in supporting technological resources.

Your city at large or entities within it may have already made a commitment to advancing digital equity. As you begin planning your own digital equity strategies, first take stock of efforts that are already underway and identify areas where coordination makes sense. This will enable the entire community to make the best use of local resources and to better serve its members.

An initial community conversation might focus on:

- Understanding the situation in the community
- Getting on the same page about the data
- Identifying the array of resources and needs available within the community that can be matched to address the challenge at hand
- Consider the kind of structure/system that will be needed to implement efforts and keep efforts going

School districts and community partners must work together to ensure that the energy to address digital equity now has long-term staying power.

Be sure to directly engage local Internet service providers in the community engagement process. If these entities are to play a role in creating conditions for a successful digital equity initiative — then they, too, must understand barriers to full connectivity that students face outside of school.

Step 3: Ensure Sustainability through Community Assets

School districts and community partners must work together to ensure that the energy to address digital equity now has long-term staying power. It's never too early to identify and begin enacting strategies to ensure that your work is sustained across leadership regimes. The Chippewa Valley Internetworking Consortium (CINC) in Wisconsin is an excellent case study in leveraging community assets on a regional level to build sustainable digital equity solutions.

Formed in 1999, CINC is a regional Community Area Network (CAN) committed to "Broadband Serving the Public Interest." It became an Unincorporated Association in 2011 and coordinates regional communication infrastructure projects with city, county and state government, educational institutions, libraries, hospitals, health care, nonprofits, and technology providers to facilitate and create innovative, competitive, and sustainable networks. Through a coordinated regional communication infrastructure, CINC helps the Chippewa Valley remain innovative, competitive, and economically viable for present and future generations.

In addition to getting community partners on the same page through the community engagement process, begin to identify the unique assets held in the community that will be crucial to sustained success. Explore real-world examples of how school districts have institutionalized their digital equity efforts in the case studies section of this report.

Step 4: Consider Outside-of-the-Box Solutions

As we connect all households – especially the poorest ones – to broadband, there are tremendous opportunities to bring in other community partners. We need to think creatively. On a CoSN delegation to Uruguay, we saw how their one-to-one program, Plan Ceibal, which sends a school device home, also delivers nutrition programs for mothers after the children go to bed. Are you reaching out to other agencies and nonprofits with missions to advance the health and employment of low-income families?

The 2015 Next Century Cities Digital Inclusion Leadership Award winners provide examples of ways that communities across the U.S. are coming up with out-of-the box ways to advance digital equity in their communities. One of the 2015 award winners is a program based in Davidson, NC, Eliminate the Digital Divide (E2D). This non-profit, a collaboration with Charlotte-Mecklenburg Schools, is a powerful example of how the very students schools seek to educate can help educate schools and the broader community about the need to aggressively pursue digital equity. Inspired by 12-year-old Franny Millen, who who wanted to help more of her classmates access the Internet at home,

E2D provides homes with school-aged children a computer and Internet access. The town's political leadership has since helped organize digital literacy classes for the community and named every second Saturday in May "E2 Lemonade Day" to support grassroots fundraising efforts. Other winners this year haven't explicitly structured their initiatives around schools, but school-aged children may benefit.

Digital equity is not easy to achieve; it takes conversation, political will, and shared commitment. That said, it can be and is being solved in some of our nation's communities.

3. School District Leadership & Innovation

Approach 1: Partner with Local Businesses on Wi-Fi Access for Learning

One way districts increase students' outside-of-school Internet access is by partnering with local businesses and centers of community activity to provide free Wi-Fi. According to the 2015 CoSN Infrastructure Survey, 15% of school systems report that there is community/business Wi-Fi available for students, a 50% increase from 2014. School costs tend to be minimal; partnerships can be branded to recognize businesses as partners in advancing digital equity and educational opportunity.

Mapping and Closing the Wi-Fi Deserts

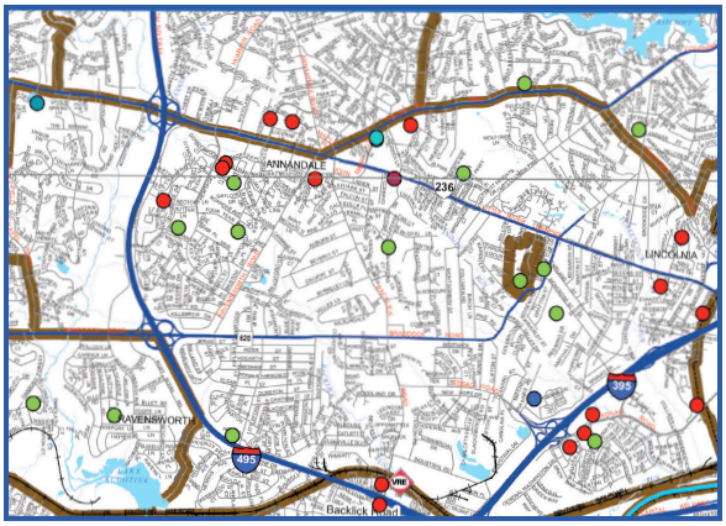
The **Forsyth County Schools** and the Cummings-Forsyth County Chamber of Commerce in Georgia partnered to increase online access for out-of-school learning across their community. Their Free Wi-Fi Directory lists access locations where students can do their homework. The program's webpage provides a search tool enabling students to easily locate community access points, and information for businesses about how to enroll as a partner site. Participating organizations receive a special window display tag. The directory is available at www.forsyth.k12.ga.us/wifi and accessible from school websites.

James McCoy, president and CEO of The Cumming-Forsyth County Chamber of Commerce, believes that the greater community also stands to benefit. "Creating a Free Wi-Fi Directory is a natural expansion of services that support our community's high quality of life standard," says McCoy. "By working together to identify and map free Wi-Fi locations, we will create

By installing Wi-Fi in places where students spend time but aren't able to get online, school districts and communities open up a whole new set of connectivity possibilities.

a cloud of coverage that not only benefits students, but those that also live and work in our community. We strive to be the most connected county along the GA 400 Technology Corridor, and the Free Wi-Fi Directory is a step in the right direction for continued development of our economic infrastructure."

Fairfax County Public Schools (FCPS) in Virginia has taken on a similar initiative to engage local partners in efforts to increase students' online access in out-of-school learning. As part of its Access4All program, FCPS mapped free Wi-Fi locations for students. Their Community Internet Access maps list access sites in neighborhoods within the district, including libraries, and community, family, and other resource centers. Here's one such map:



Pro/Con:

▲ Minimal school district costs

▲ Increased community engagement in digital equity

▲ Can provide community access if parked in low-income neighborhoods

▼ Business hours, student schedules not aligned

▼ Limited business hours

▼ Lack of transportation to/from Wi-Fi access points

Approach 2: Make the Most of Existing Assets

By installing mobile broadband hotspots in places where students spend time, school districts and communities open up a whole new set of connectivity possibilities. A number of school districts leverage their buses to enable more online time for children as they travel to and from school, and even after they've returned home. Connectivity on buses appears to reduce behavioral problems, as students focus more on their screens and less on creating disturbances. Huntsville City Schools reported a 70% drop in discipline problems after installing hotspots on their buses. This can increase district costs, but gives students more learning and homework time, and it adds up fast: based on a 30-minute bus ride, this represents *30 more school days* per year of potential time-on-task.

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Located in a high poverty, desert valley in southern California, **Coachella Valley Unified School District** (CVUSD) spans a 100-square-mile area. Average daily bus time per student is one hour; for some, it's nearly *four*. They've transformed transit time into a learning asset. In the 2014-15 academic year, CVUSD piloted mobile broadband aboard two buses for connectivity during transit. Parked overnight by low-income households, they become Internet connectivity hubs for families. Following a successful pilot year, the school board in summer 2015 approved the purchase of hotspots for installation on all 97 of the district's buses. The $232,065.33 allotted to purchase the hardware will come from the district's general fund and includes 11 months of Verizon Internet service, and solar panels for 10 buses, enabling evening usage beyond the one hour battery life the bus allows. As a note, operational costs for 97 buses is about $80,000 per year; in other words, a lot of that $232,000 was hardware. On January 4, 2016, PBS NewsHour featured CVUSD's incredible work. Watch the video.

Miami-Dade County Public Schools is embarking on a connected school bus initiative of epic proportions. With their largest-in-the-world fleet of 1,300 school buses transporting 60,000 students daily, the district is using Kajeet SmartBus. The hardware and software connects students on the go while ensuring CIPA-compliant filtering. They buy bulk data from Verizon and Sprint, placing it into a Kajeet account that buses tap. Access doesn't expire and they can add more whenever needed. Learn more.

Pro/Con:

▲ Leverage existing school district assets for greater benefit

▲ Students use transit time for learning and homework

▼ Considerable district cost

Partnering with City Governments to Add Wi-Fi

The City of Charlottesville, VA is collaborating with Albemarle County School District to add free Wi-Fi in laundromats around the city, a clever means of providing low-income families Internet access. Similarly, mapping out district-owned buildings across the community where there is Wi-Fi could allow access to the filtered school portal. These sorts of efforts are game changers when thinking about providing outside-of-school access for learning.

Approach 3: Seek Mobile Hotspot Programs and/or affordable LTE

Mobile hotspot lending programs are a great way for school districts to ensure students have Internet access wherever they go. Nearly 5 percent of school districts are taking this approach, according to the 2015 CoSN Infrastructure Survey. School systems must ensure mobile hotspots are CIPA-compliant, providing age-appropriate filters. Typically, these hotspots cap bandwidth allowed per student.

Even with home broadband, mobile hotspots can prove useful.

The ability to connect to the Internet anywhere with a mobile hotspot is particularly effective in advancing digital equity among students whose households frequently move. An Urban Institute report reveals mobility trends among school-aged children that make more traditional wired home broadband plans potentially less suitable. Studies cited in this report reveal that approximately 13 percent of children under 18 move from one year to the next; low-income children and adults move even more often, and approximately half of all low-income households move within two years. Even with home broadband, mobile hotspots can prove useful. For example, many students don't return home until adult guardians return from work.

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Miami-Dade Public Schools offers school lunch eligible students Sprint's ConnectEd. From now through June 30, 2019, the Sprint broadband service (Spark) is available to 50,000 low-income families. This 3GB per month service, only available for eligible students living in Sprint-served territory, is offered for four years once activated. The district and/or family must provide the device; once the monthly 3GB limit is hit, they cannot add more data on that device and the connection is slowed. According to Deb Karcher, that hasn't been a major problem because home access is still going through the district filter. That said, Karcher expressed concern about situations where other family members connect to the device and compromise the primary student's usage. She also points out that students smartly seek free Wi-Fi from places like McDonald's, Starbucks, and Target to download bandwidth intensive apps. For further information about how the program works, here's a detailed FAQ.

The **School District of the City of Pontiac**, MI, uses filtered mobile hotspots with managed service from Kajeet that scales to the number of devices they need and months they need them, with no overage charges. Tracking data usage through managed service is the key to predictable fees.

In Kansas City, Missouri, public libraries and school districts ally their efforts to creatively advance digital equity. In the 2015-16 academic year, the Kansas City Public Library (KCPL), **Kansas City Public Schools**, and local non-profit organizations Literacy Kansas City and Connecting for Good piloted a mobile hotspot lending program. During this pilot year, 25 mobile hotspots will be made available to students in two high schools facing challenges in accessing online content outside of school. This pilot was made possible through a grant from Rhode Island-based nonprofit Mobile Beacon, offering low-cost Internet access and mobile hotspots for educational institutions. Learn more here and here.

School and community leaders would do well to encourage this next type of program. The Library Hotspot program of the **New York Public Library** is an outstanding example of how public libraries are making bold moves to support patrons in gaining full access to the Internet. Through the program, patrons may borrow a device and service for up to one year. Learn more.

Just how much data *does* a student need? Education leaders need to know reasonable averages that meet the need but don't break the bank.

Alvin Dunn Elementary School in San Marcos, CA, participated in a technology project to evaluate the impact of mobile learning and anytime, anywhere Internet access with a goal of addressing the homework gap. The project provided each of Alvin Dunn's 77 6th-grade students – 59% of which did not have access to high-speed broadband connectivity at home – with tablets connected via LTE mobile broadband service. Among the results:

- 96% of the students specifically impacted by the homework gap stated that gaining access to an LTE- connected mobile device helped them to become better students

- 78% of students stated they "worked together with my classmates more often" as a result of taking a device home and have "always on" connectivity

These students also developed stronger self-efficacy as serious learners, with 55% reporting that they had more confidence in their abilities to be successful after introduction of the connected tablets, and 52% stating they were more interested in what they were learning in class now they could use the tablet both at school and at home. More on this project can be found here and here.

Based on these results, additional programs are underway to optimize costs and offer the same Internet safeguards for LTE that apply to on-campus Wi-Fi.

How Much Data Does a Student Need?

So, to close the homework gap, just how much data *does* a student need? This is not a simple question, but it is an important one. The easy answer: *"It depends."* However, education leaders need to know reasonable averages that meet the need but don't break the bank. As more learning content increasingly goes digital, one thing is certain: the amount of data students require for out-of-school learning will also increase.

Ericsson found that 61% of commercial mobile app traffic is from Facebook, YouTube, Netflix, Instagram, and Snapchat. Unlimited access to these social media/video sites will likely bust anyone's budget, even on a 5 GB plan. Some districts recommend blocking consumer video services like YouTube but allowing education video services (e.g. TeacherTube, SchoolTube, YouTube for Schools, Khan Academy, TedEd, PBS LearningMedia, etc.).

According to Michael Flood, Vice President for Strategy at Kajeet, "Even with consistent 'acceptable use' policies, the practices of the educator/student can vary data usage – are they in a Virtual Learning program that relies heavily on video conferencing? Are they online all the time (such as a virtual or hospitalized student), or only for 'homework hours' in the afternoon, evening, and/or weekend? A student's device type also influences usage as different platforms push out OS/App updates with different frequencies."

Flood points out that monthly usage per student on Kajeet's Managed Education Broadband (involving thousands of students across 31 states and 140+

Another key strategy has been Wi-Fi upgrades at school campuses and other public buildings that have a high incidence of student use.

districts) averages under 1GB. This varies based on school policies for when, and how the connectivity can be used. For example, districts that switched from environments whose design isn't tailored for off-campus student behaviors have seen as much as a 3x-5x reduction in average data usage, primarily from the careful management of consumer entertainment uses.

Pro/Con:

▲ Students have Internet access wherever they go

▲ Particularly relevant for students spending time in multiple households or frequently moving

▲ With school-provided access, educators can gain visibility into student activity that can inform improved academic strategies or evaluate the use of instructional resources

▼ Amount of data available per student varies depending on school-provider arrangements. Students may encounter data limitation challenges.

▼ Allowable hotspot use may be limited to student use for homework, thus not a viable approach to advancing household-wide digital equity

▼ Up front and ongoing cost for schools

Approach 4: Take Advantage of Special Broadband Offerings

Eleven percent of school districts promote programs which provide reduced-price Internet service, according to CoSN's 2014 Infrastructure Survey.

Connect2Compete (C2C) provides an important on ramp for qualifying households. Run through national digital divide nonprofit EveryoneOn, C2C targets K-12 students and provides affordable Internet and devices to national school lunch program eligible students and families and is offered in partnership with Cox, Bright House Networks, MediaCom, Suddenlink, Comcast's Internet Essentials, and others. Eligible customers receive fast, affordable Internet for as low as $9.95 per month (plus tax). For most customers, there is no deposit, no contracts, and no installation or modem rental fees.

A household may qualify for EveryoneOn's C2C program if they meet the requirements. For the most up-to-date information about the program's eligibility requirements, visit Connect2Compete. Adoption rates have been found to be a problem in some low-income communities.

In April 2016, AT&T will launch a low-cost wireline home Internet program for households within its 21-state wireline service area with at least one resident participating in the Supplemental Nutrition Assistance Program (SNAP). Qualifying households will receive the fastest of three potential speeds (10, 5 or 3Mbps) available at the family's address, priced (depending on speed) at either $10 or $5 per

month (plus tax). AT&T's program also has no term commitment or deposit requirement, and no installation or modem fees. For complete details and eligibility requirements, visit: att.com/access after March 1.

DigitalEquity LEADERS&INNOVATORS

Revere Public Schools has prioritized outside-of-school digital equity, highlighting it in the District's 2013-2016 Technology Plan. The high school is already a one-to-one device per student environment; the district is extending this to middle and elementary schools. Students take home iPads and Chromebooks, so outside-of-school access is key. Strategies identified to address digital equity include: allowing computer labs access before/after school, and working with the Public Library to provide community access and literacy programs.

Another key strategy has been Wi-Fi upgrades at school campuses and other public buildings that have high incidence of student use. The district also disseminates to students and staff a list of free after-school Internet access locations.

They were also very aggressive in making Comcast's Internet Essentials available to school lunch eligible households. The community used some of the cable fees it received due to its license to Comcast to subsidize that $9.95 monthly cost.

Paul Dakin, Superintendent of Revere Public Schools, talked about this effort, which also reminded Revere Mayor Daniel Rizzo of Revere's Get Your Business Online, which used students to help local businesses get online. Watch the video.

While these programs play a critically important role in enabling youth and educators to connect in the home, they may not be the most ideal solutions for students who spend time in multiple homes, some of which may not possess a home Internet subscription. Companies commit to offering such broadband discounts for a limited time, and restrictions can exist. Read the fine print before becoming a promotion partner.

In **Chattanooga, Tenn.**, the city's world-renowned high-speed gigabit Internet provider, EPB, has created a subsidized offering for households with children who qualify for free or reduced lunch. In 2015, they began offering low-income households 100 megabit-per-second Internet (billed as 'the nation's fastest') for just $26.99 a month, less than half their normal rate (read news article).

Tech Goes Home Chattanooga (TGH CHA), an initiative of the Enterprise Center, an economic development organization, works closely with the school district on this and other efforts to support low-income residents with reduced-cost offerings. Partnering with schools, public libraries, churches, nonprofits, and other organizations, they also offer free courses designed to help residents develop skills and habits required for smart technology and Internet use. Participants receive fifteen hours of classroom training to help them understand why the Internet is relevant in their daily lives, earn the option to purchase a new Chromebook for only $50, and get assistance in obtaining access to low-cost home Internet. TGH CHA is modeled after the national, award-winning Tech Goes Home program. Founded in Boston, Tech Goes

School districts and universities sometimes own educational broadcast spectrum, dating back to when educational television was broadcast to the community.

Home has successfully provided participants with the tools, education and access required for 21st century skills development since 1999.

Pro/Con:

▲ Engages local providers in devising digital equity solutions

▼ Duration of offerings uncertain

▼ Research shows that few families sign up for this type of service

Approach 5: Repurpose Educational Spectrum

Repurposing Educational Broadband Service (EBS) spectrum is one of the most ambitious and innovative approaches school districts are now employing in pursuing digital equity. One of the largest spectrums FCC-allocated for advanced wireless services in the U.S., the EBS band is licensed within defined geographic service areas (GSAs) to educational institutions, and nonprofit entities with educational missions. GSA for a typical EBS license extends in a circle 35 miles out from a central point within the market. Bandwidth is 22.5 megahertz (MHz) per typical channel group/license. There are five EBS channel group licenses in each market area for a total of 112.5 MHz of EBS spectrum per market area. For additional background and technical information, visit EBSspectrum.org.

DigitalEquity LEADERS & INNOVATORS

Albemarle County Public Schools (ACPS) in Virginia is undertaking a very impressive initiative to utilize EBS for home connectivity. ACPS spans 726 square miles at the foothills of the Blue Ridge Mountains, including Charlottesville, Virginia. Geographically diverse, it is comprised of urban and rural communities with pockets of poverty and low levels of both broadband adoption and access. According to the National Digital Inclusion Alliance, broadband is not available through either cable or commercial 4G cellular service in the district's rural areas.

About two years ago, CTO Vincent Scheivert discovered that ACPS owned educational broadcast spectrum (EBS) licenses. School districts and universities sometimes own these, dating back to when educational television was broadcast to the community. The school district had leased theirs out for years. Scheivert recognized that this could bring community broadband to students living in poor communities and remote areas without a current broadband provider. After registering the spectrum with the FCC, they began a test of concept. First, they started small using the 2.5 Gigahertz spectrum with mounted antennas on school buildings. The collaborative effort included partnerships with local police and fire agencies.

Over an eight-mile area, the pilot successfully provided bandwidth speeds averaging 13 Megabits per second (moderately fast) to unserved families. This was important, and yet, uncertain because the 2.5 Gigahertz spectrum (considered true broadband) doesn't typically do well in densely-built

areas. After the initial positive results, ACPS extended the LTE network to students living in low-to-medium income remote areas and is working on a residential pilot with public housing agencies.

With additional financial support, the district plans to extend this Wi-Fi / spectrum usage to all students. The project currently remains a "proof of concept" available only to families in certain mostly underserved geographic areas. Expanded service would occur within a 3-5 year period. They've appealed to the FCC for a waiver allowing use of E-rate funds to address outside-the-school digital equity. The decision is pending.

Pro/Con:

▲ Leveraging an underutilized resource (EBS licenses) for considerable geographic reach across a district

▼ Start-up costs may be significant for some districts and require technical sophistication

Approach 6: Create a Mesh Network

Community mesh networks offer important lessons for school districts ready to really innovate, and those seeking a high level of self determination and shared community ownership of digital equity solutions. There are many different types of networks. According to Commotion Wireless, *community* networks are built by a coalition of community anchor institutions, community-based organizations, municipal representatives, and individuals working together to plan, design, and deploy a network. Ownership and management duties are distributed among the community. *Digital stewards* are community members that take care of the network. Most everyday networks with which we interact are based on a hub and spoke model. In contrast, in mesh networks, any point, or 'node', in the network can talk to any other node, similar to how humans network. Read more about this basic definition and how to create a mesh network in the Commotion Construction Kit.

DigitalEquity LEADERS&INNOVATORS

A very exciting effort to leverage mesh networking for out-of-school Internet access is underway in **Beaufort County, S.C.**, where Superintendent Jeffrey Moss and Chief Instructional Services Officer Dereck Rhoads are working with their county government to create such a network. Their goal is to create ubiquitous outside-of-school access.

A wireless mesh network (WMN) connects wireless access points installed at each network user's locale. Each network user is also a provider, forwarding data to the next node. The infrastructure is decentralized and simplified because each node need only transmit as far as the next. Wireless mesh networking could allow people living in remote areas and small businesses operating in rural neighborhoods to connect their networks together for affordable Internet connections.

School districts exploring ways to build local capacity for digital equity initiatives, and wishing to deepen their knowledge, will find these entities to be a great source of support.

To close the homework gap, Beaufort County is considering WMN, weighing cost/benefits of each of their options. A finalized decision for WMN in Beaufort County is planned for early 2016. The county effort is considered an economic development project. The coastal county is a prime tourist destination with Hilton Head, Point Royal, and other beautiful beaches nearby. The county and school district plan to provide free community Wi-Fi via the WMN while charging tourists for similar access. Critics may say WMNs distract from providing home gig-level access, but it is nonetheless yet another option for addressing digital equity.

Pro/Con:

▲ Significant self determination in development and use of network

▼ Some start up costs

▼ Doesn't provide home gigabit connectivity

4. Case Studies: School District Leaders & Innovators

The case studies below detail how communities have institutionalized efforts to make digital equity for out-of-school learning a lasting priority:

■ Nashville, TN - Government, education, business, and community leaders collaborate for success.

■ Provo, UT - Getting to digital equity in a gigabit city.

■ Revere, MA - An exemplary partnership between a mayor and superintendent.

■ Beaufort, SC - A community works together to create a mesh network.

■ Charlotte-Mecklenburg, NC - A district enacts a bold inside- and outside-of-school digital equity strategy.

■ Chattanooga, TN - A superfast Internet city helps its lower-income parents and students stay up to speed with skills and service.

▶ Additional case studies - Further explore stories of digital equity success.

A good survey will begin to uncover and profile in some detail the nature of the challenges to out-of-school Internet access that your students may experience.

5. What's on the Horizon?

Several initiatives underway within the federal government and through non-profit organizations hold great promise in helping schools to advance their digital equity interests. School districts exploring ways to build local capacity for digital equity initiatives, and wishing to deepen their knowledge of what other communities across the country are doing, will find these entities to be a great source of support:

Broadband Opportunity Council. On March 23, 2015, President Obama signed a memorandum creating the Broadband Opportunity Council. Including 25 federal agencies and departments, the Council will engage with industry and other stakeholders to understand ways the Executive Branch can be more responsive to the needs of communities seeking broadband investment. They will also identify and recommend steps to remove regulatory barriers which unduly impede broadband deployment, adoption or competition. On September 21, 2015, the White House released a report chronicling the Council's work to date and includes specific action items for each agency. Nearly $7.5 billion in federal broadband network investments have been made available to connect under-served areas.

FCC Lifeline Program Modernization. Supporters of increasing broadband access for all students advocate for the expansion of the FCC's Lifeline program, which serves millions of households with discounted monthly telephone service, to include broadband Internet connectivity. If the program changes to allow low income-families to choose between a basic phone and broadband at home, school systems should familiarize themselves with this program to educate eligible families on the benefits broadband provides for learning at home.

Next Century Cities. Across the country, mayors and local officials are already recognizing the importance of leveraging gigabit-level Internet to attract new businesses and create jobs, improve health care and education, and connect residents to new opportunities. Next Century Cities is committed to getting mayors to take a pledge to being a gigabit city. Then they celebrate these successes, demonstrating their value, and helping other cities to realize the full power of truly high-speed, affordable, and accessible broadband.

National Digital Inclusion Alliance. The National Digital Inclusion Alliance is a unified voice for local technology training, home broadband access and public broadband access programs. They work collaboratively to craft, identify and disseminate financial and operational resources for digital inclusion programs while serving as a bridge to policymakers and the general public.

Appendix 1: Sample Out-of-School Connectivity Survey

The student and parent survey items on the following pages can be used by the district or at the school level to give context to the so-called 'homework gap' in your community. A good survey will begin to uncover and profile in some detail the nature of the challenges to out-of-school Internet access that your students, and parents/guardians, may experience. Minimally, a survey should address devices, places and speed (see page 6).

Below are templates intended as a starting point; customize or alter them to suit your situation.

For example, if a district has already decided to send Chromebooks home with students, the parent survey might ask, *"If your child is assigned a Chromebook by his/her school, what options exist to connect that device to the Internet using Wi-Fi in your home?"*

Student Survey:

What type of technology do you use at home? (Check all that apply)

- o Desktop PC
- o Laptop
- o iPad
- o Android tablet
- o Kindle or Nook
- o Chromebook
- o Smart phone
- o None
- o Other (please specify)

How do you access the Internet at home?

- o Broadband (through a cable company hotspot)
- o DSL (through the phone company)
- o Dial-Up (must connect via phone dial)
- o Cellular service
- o No Internet access

Are you able to access and or use your device to do schoolwork?

- o I can't use my device at home
- o Limited access 1-2 hours
- o Medium access 3-4 hours
- o Unlimited access

What school related activities do you do on your device?

- o Reading
- o Writing
- o Math
- o Projects/Presentations
- o Research
- o Other (Please specify)

Overall, how comfortable are you using your device for schoolwork?

- o Not at all comfortable
- o Not very comfortable
- o Somewhat comfortable
- o Very Comfortable

What other activities do you use your device for?

- o Social Media (e.g., Twitter, Instagram, Snapchat, etc.)
- o Games
- o Music
- o Movies
- o Digital Art
- o Media (e.g., online magazines, TV shows, etc.)
- o Other (Please specify)

(student survey continued next page)

(student survey continued)

Do you use the Internet to complete your schoolwork outside of school?

- o Never
- o Sometimes
- o Often
- o Always

How many other members of the household share the device you primarily use for schoolwork?

- o 1
- o 2
- o 3
- o 4
- o 5+

Do you use your personal device while at school?

- o Yes
- o No

What other places in your community do you use to access the Internet?

- o Library
- o Commercial Business (e.g., coffee shop, restaurants, etc.)
- o A Friend's House
- o A Family Member's House
- o Place of Worship
- o Other (Please Specify)

What is the connection speed that you need, to engage in anywhere, anytime learning?

- o *Moderate.* Enough to get online, check in, and comfortably browse the web.
- o *Fast.* Enough to smoothly stream video, quickly download large files, etc.
- o *Lightning speeds.* Fastest possible connection for all sorts of projects.

Do you have access to this connection speed in your home?

- o Yes
- o No
- o Most of the time, but not always
- o Sometimes, but not enough
- o Other situation (explain)

Do you have access to this connection speed in other places in the community where you do school work?

- o Yes
- o No
- o Most of the time, but not always
- o Sometimes, but not enough
- o Other situation (explain)

Parent Survey:

What type of technology do you use at home?

- o Desktop PC
- o Laptop
- o iPad
- o Android tablet
- o Kindle
- o Chromebook
- o Other (please specify)

How many devices are being used in the household?

- o 1
- o 2
- o 3
- o 4
- o 5+

How do you access the Internet at home?

- o Broadband (via cable vendor hotspot)
- o DSL (through phone company)
- o Dial-Up (must connect via phone dial)
- o Cellular service
- o No Internet access

How often do you use your home device for personal use (e.g., business, bill pay, etc.)?

- o Generally don't use computer at home
- o Limited access 1-2 hours
- o Medium access 3-4 hours
- o Unlimited access

Overall, how comfortable are you using your home device?

- o Not at all comfortable
- o Not very comfortable
- o Somewhat comfortable
- o Very Comfortable

How many other members of the household share the device(s)?

- o 1
- o 2
- o 3
- o 4
- o 5+

If you have a smartphone or mobile broadband modem, who is your Service Provider for the Data Plan?

- o AT&T
- o Verizon
- o Sprint
- o T-Mobile
- o Kajeet
- o US Cellular
- o Other (please specify)

Would you be willing to allow your child to use personal device in school if it were part of the curriculum?

- o Yes (please explain)
- o No (please explain)

(parent survey continued next page)

(parent survey continued)

What is the connection speed that you need for your child to stay connected to learning and school, and for you to stay connected to their school?

- o *Moderate.* Enough to get online, check in, and comfortably browse the web.
- o *Fast.* Enough to smoothly stream video, quickly download large files, etc.
- o *Lightning speeds.* Fastest possible connection for all sorts of projects and activities.

Do you have access to this connection speed in your home?

- o Yes
- o No
- o Most of the time, but not always
- o Sometimes, but not enough
- o Other situation (explain)

Do you or your child have access to this connection speed in other places in the community where you go or where your child does school work?

- o Yes
- o No
- o Most of the time, but not always
- o Sometimes, but not enough
- o Other situation (explain)

Appendix 2: Research & Resources

Research and resources by Friday Institute.

Digital Equity

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Acknowledgements

We thank Founding Sponsors Kajeet, Dell, Qualcomm, and Google Fiber for the support that made this initiative possible.

Anne Schwieger did the initial work on the toolkit. **Victor Rivero** provided editing and design for the document.

Many individuals have made this important work on Digital Equity by CoSN possible. CoSN gratefully acknowledges the following individuals for their many contributions to making this initiative a success:

Ann Coulter, Coulter Consulting
Susan Crawford, Professor, Harvard Law School
Paul Dakin, Retired Superintendent, Revere Public Schools, MA
Chris Dede, Professor, Harvard Graduate School of Education
Diane W. Doersch, Chief Technology & Information Officer, Green Bay Area Public Schools, WI
Michael Flood, VP Strategy, Kajeet
Adam Garry, Director, Education Strategy, Dell
Laura Hansen, Director of Information Management and Decision Support, Metropolitan Nashville Public Schools
Ken Hays, President & CEO, Enterprise Center, Chattanooga, TN

John Horrigan, Senior Researcher, Pew Research Center
Deborah Karcher, CIO, Miami-Dade School District, FL
Crosby Kemper, Librarian, Kansas City Public Library, MO
Eric Klopfer, Professor, MIT
Zach Leverenz, CEO, Everyone On
Denise Lim, former Policy Researcher, Harvard Kennedy School
Pam Lloyd, Vice President, GCI
Kelly McCarthy, Tech Goes Home Chattanooga, Enterprise Center, TN
Vicki Mealer-Burke, Vice President, Education, Qualcomm
Andrew Moore, CIO, Boulder Valley School District, CO
Jeffrey Moss, Superintendent, Beaufort County School District, SD
Lori Quillen, Program Officer, Benwood Foundation
John Phillips, Managing Director, Strategy - Global Education, State & Local Government Practice, Dell
Keri Randolph, VP, Learning & Director of the STEM Innovation Hub for Public Education Foundation, TN
Dereck Rhoads, Chief Instructional Services Officer, Beaufort County School District, SD
Keith C. Rittel, Superintendent, Provo City School District, UT
Dan Rizzo, Mayor, Revere, MA
Jessica Rosenworcel, Commissioner, Federal Communications Commission
Anne Schwieger, Consultant, MA
Vincent Scheivert, CTO, Albemarle County Public Schools, VA
Angela Siefer, Director, National Digital Inclusion Alliance
Steve Smith, CIO, Cambridge Public Schools, MA
Deb Socia, Executive Director, Next Century Cities
Erica Swanson, Head, Community Impact Programs, Google Fiber
Valerie Truesdale, Chief of Technology, Personalization and Engagement, Charlotte-Mecklenburg Schools, NC
Devin Vodicka, Superintendent, Vista Unified School District, CA
Alisson Walsh, Communications, Outreach Manager, Mobile Beacon
John Windhausen, Executive Director, Schools, Health, Libraries Broadband Coalition

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