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DATACASTING IMPLEMENTATION GUIDE:

Equitable Innovations in Action

AUTHORS

American Institutes for Research:
Bobbi Newman, Uyen Chu, Femi Fadeyi, Beth Howard-Brown, and Felice Trirogoff

Pennsylvania Department of Education:
Judd Pittman and Erin Donohoe

WITF, Inc., Pennsylvania: Ron Hetrick

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INTRODUCTION

This Implementation Guide has been created and developed by the American Institutes for Research® (AIR®), Pennsylvania Department of Education (PDE), and Pennsylvania PBS (PA PBS) member stations. The content is informed by the datacasting community of practice (CoP) formed in early 2021 with stakeholders from state education agencies (SEAs), libraries, and public broadcast stations to discuss best practices and how to address potential hurdles in datacasting implementation. (For more information about the datacasting CoP, see the Network of Support section). The purpose of this guide is two-fold: (a) to provide an overview of datacasting as an example of a viable solution to help bridge the digital divide and (b) to outline a framework for states, districts, and their public media television stations to pursue datacasting as a solution to address disparities in education related to students lacking reliable internet. The target audiences for this guide are SEAs, school districts, PBS member stations, public libraries, and the general public interested in pursuing datacasting as a resource to help combat the digital divide.

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1. OVERVIEW OF DATACASTING

Datacasting is a term derived from the words *data* and *broadcasting*. Datacasting is the one-way broadcasting of data through a television signal. If a location can receive a television broadcasting signal, it can receive any type of data file (videos, documents, slides, ebooks) via datacasting signals. As PBS member stations television spectrum reaches 97% of Americans—far more than broadband connectivity—datacasting can serve rural and urban students, increasing their access to rich digital educational resources. For years, this technology has been used to deliver encrypted and targetable public safety data to police, fire, and other first responders. But now, datacasting can assist educators in sending targeted, standards-aligned curriculum and instructional activities to students directly on their Wi-Fi-enabled personal devices. In addition, datacasting seamlessly integrates with other learning management systems such as Schoology or Google Classroom and reduces educator workload by not creating separate datacasting lessons.

The datacasting equipment students need is a Wi-Fi-enabled device, an antenna, and an education device.

The use of datacasting goes beyond remote learning, which has expanded nationwide due to the COVID-19 pandemic. States including South Carolina, Indiana, Kentucky, South Dakota, Michigan, Virginia, and Pennsylvania support districts and schools using datacasting to strengthen afterschool learning, summer learning, student learning within the juvenile justice system, and workforce development for adult learners.

HOW DATACASTING WORKS

DATACASTING CONSISTS OF THREE PHASES.

The first phase includes content creation or selection, in which educators or librarians create and/or select and then package high-quality digital learning content for their students and upload the lesson to Information Equity Initiative's education platform (IEI's education platform.) IEI's education platform compatible with other learning management platforms (e.g., Google Classroom, Schoology). Any type of file (e.g., jpg, PDF, mp4) can be transmitted via datacasting.

Reaches 97% of Americans—far more than broadband connectivity

The second phase encrypts the content and sends it to a public broadcasting station or its affiliate broadcasting network over a secured signal.

The third and final phase transmits the encrypted data to a small antenna and education device in the home or facility. The education device creates a Wi-Fi hotspot, which allows students to access the content via a computer, tablet, or other mobile device.

CONTENT

Teachers assemble and send instructional content aligned to state standards.

SECURE SIGNAL

Broadcast tower securely sends instructional content.

DELIVERY TO STUDENT

Student's education device downloads instructional content.

2. DATACASTING AS A SOLUTION TO ADDRESS DIGITAL DIVIDES AND INEQUITIES

The **digital divide** is defined in a number of ways. According to the U.S. Department of Education (2017), the digital divide is defined as the schools and communities in which access to devices and internet connectivity are unavailable or unaffordable. The definition also extends to include students who struggle with accessing devices or reliable high-speed internet, or both. Often times students who experience these access gaps differ depending on socioeconomic status, race, and/or gender *(Nemer, 2015)*. In a world that is reliant on technology and becoming increasingly more so on broadband for learning in and outside of school, a lack of access to technology is undoubtedly harmful to a student's success. For example, research has found that, on average, students with high-speed internet access at home report an overall higher GPA than students with no access *(Hampton et al., 2020)*. As more schools and communities gain access to the internet, a **digital use divide** persists. The digital use divide is explained as the separation between students who use technology in ways that transform their learning from those who use the tools to complete the same activities but now with an electronic device (e.g., digital worksheets, online multiple-choice tests). Essentially, there is a gap between learners who are using technology "in active, creative ways to support their learning and those who predominantly use technology for passive content consumption" *(U.S. Department of Education, 2017, p. 7)*.

AN ESTIMATED 12 MILLION STUDENTS ACROSS THE COUNTRY CONTINUE TO LACK INTERNET SERVICE

The digital divide can reinforce existing social inequalities and even exacerbate them because they carry over preexisting perceived differences in human capital into school and online learning spaces. Digital divides persist via socioeconomic status—school-aged children in households that are below the federal poverty threshold are much less likely (53%) than those above (79%) to have access to both broadband and a computer (Public Policy Associates, 2020). In relation to race, White school-aged children (80%) have better access than African American/Black (64%) or Hispanic/Latinx (66%) children, and just 50% of American Indian and Alaskan Native children have full access (Public Policy Associates, 2020). Regarding gender, men have more access (66%) to home broadband connections than women (64%), according to a survey in 2018 (Pew Research Center, 2021). And regarding geographical location, 37% of rural students do not have adequate connectivity, compared to 25% of suburban students and 21% of urban students (Chandra et al., 2020).

Broadband gaps can be further explored using The Indicators of Broadband Need map created by the United States Department of Commerce, National Telecommunications and Information Administration (NTIA). Gaps are not limited to broadband access alone but also include the speed of broadband, in addition to a lack of access to hardware and software. Overall, these gaps widened during the pandemic, and despite states' efforts to close the digital divide during the pandemic, an estimated **12 million students** across the country continue to lack internet service or use a patchwork system of short-term fixes to participate in remote learning.

Furthermore, most state efforts that began in March 2020 are temporary, stop-gap measures, with 75% of those efforts set to expire in the next 1–3 years based on current funding sources *(Tate, 2021)*.

SCHOOL-AGED CHILDREN WHO HAVE BOTH BROADBAND AND COMPUTER ACCESS

THE FEDERAL POVERTY THRESHOLD

53% Below poverty

79% Above poverty

Public Policy Associates, 2020

RACE

80% White

64% African American/ Black

66% Hispanic/Latinx

50% American Indian/ Alaskan Native

Public Policy Associates, 2020

GENDER

66% Men

64%, Women according to a survey in 2018

Pew Research Center, 2021

GEOGRAPHICAL LOCATION

37% Rural students

25% Suburban students

21% Urban students

Chandra et al., 2020

CASES OF INEQUITIES

Datacasting can also provide a solution to close the homework gap, mitigate learning loss, and support juvenile and adult justice facilities.

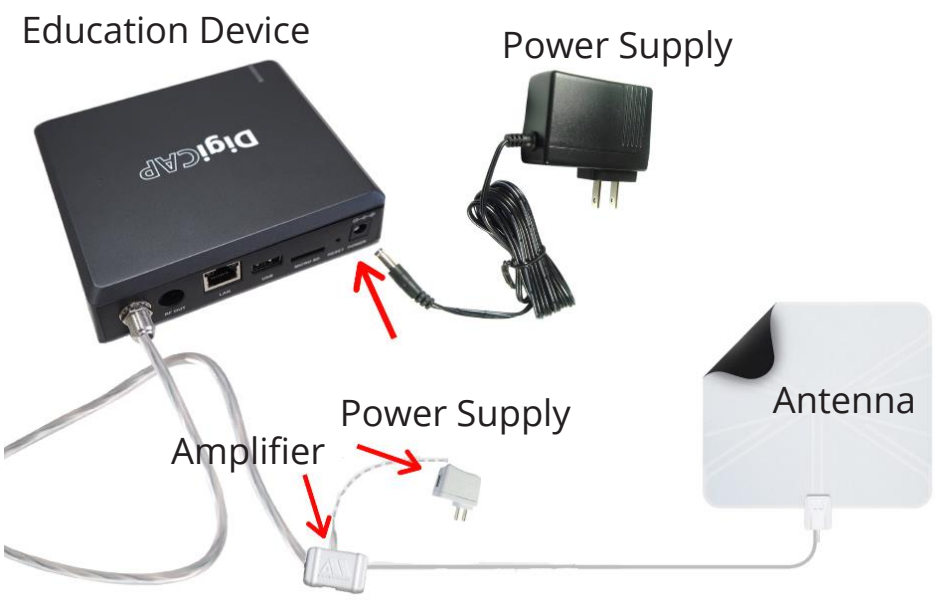
HOMEWORK GAP

Jessica Rosenworcel, Chairwoman of the Federal Communications Commission, coined the term "Homework Gap" as a problem facing communities where kids cannot access the internet because infrastructure is inadequate, their families cannot afford it, or both *(Basu, 2020)*. According to a Pew Research Center analysis of data from the 2018 National Assessment of Educational Progress (NAEP), most eighth-grade students in the United States rely on the internet at home to get their homework done *(Auxier & Anderson, 2020)*. Roughly 6 in 10 students (58%) say they use the Internet at their home to do homework every daxy or almost every day. The students who make up a disproportionate share of the households that lack high-speed broadband internet access are Black students, Latinx students, students from low-income families, or students from rural districts *(Kelley & Sisneros, 2020; (Auxier & Anderson, 2020)*.

Students impacted by the homework gap must take difficult measures to gain access to reliable high-speed internet. For example, they may have to drive to a public library or a store or restaurant parking lot to access a signal. In many situations, students without internet access at home have no alternative place to go online outside of school *(Hampton et al., 2020)*. Researchers studying the digital divide found that even for students who seek out alternative places to get online, their online activities outside of school were far less diverse than those with a dedicated home internet connection *(Bauer et al., 2020)*.

In addition, students who do not have access to high-speed internet at home are unable to conduct robust research or connect and collaborate with their classmates and teachers. Further, students are hindered in their exploration of other learning programs or opportunities, such as researching postsecondary college and career opportunities. One study found that students who do not have access to the internet from home or are dependent on a cell phone perform lower on digital skills, homework completion, grade point averages, and standardized tests. *(Hampton et al., 2020)*.

Limited access to high-speed internet also affects out-of-school learning time. Achievement gaps widen during out-of-school time when additional learning opportunities are lost—during the summer, after school, or as of recently—during a pandemic.



HOMEWORK GAP: a term used to describe the difficulty millions of students have in getting online at home to complete school assignments. The homework gap impacts poor, minority, and rural students.

Roughly 6 in 10 students (58%) say they use the Internet at their home to do homework every day or almost every day.

The students who are unable to readily access high-speed internet at home are unable to hone crucial academic skills that are imperative to their learning and academic development.

SUMMER LEARNING LOSS

Research has found that summers contribute to achievement disparities more than school years *(Atteberry & McEachin, 2021)*. As one study found, the "typical student showed summer learning loss across all studied grades in both reading and math. The median summer losses are fairly large in magnitude, ranging from losses of one to two months in reading and a little more than one to three months of school-year learning in math" *(Kuhfeld, 2019)*. Research on students' summer experiences suggests wide variation in time use and learning, especially for minority students and students from low-income families. The negative impact of summer on students of lower socioeconomic status is often referred to as "summer setback" *(McEachin & Atteberry, 2017)*. White and middle-class children often exhibit learning gains over this time period, whereas minority and/or disadvantaged children experience losses. One theory to explain seasonal differences in learning is the "Faucet Theory" proposed by *Entwisle et al. (2001)*. The theory posits that the "resource faucet" is on for all students during the school year, but over the summer, the flow of resources slows for students from disadvantaged backgrounds and remains steady for students from advantaged backgrounds, meaning that student achievement disparities will widen dramatically. Students without access to the internet during the summer months are even more susceptible to summer learning loss.

LEARNING LOSS:
Any specific or general loss of knowledge and skills, most commonly due to extended gaps or discontinuities in a student's education.

LEARNING LOSS DURING THE COVID-19 PANDEMIC

The onset of the COVID-19 pandemic led to a decrease in student academic learning and engagement that resulted in a decrease in academic achievement *(Betebenner & Wenning, 2021)*. Furthermore, a legacy of the pandemic will be the lost learning that has disproportionately affected students of color and those from low-income families *(Jacobson, 2021)*. For example, district leaders at both the elementary and secondary levels were less likely to report that their teachers covered all the content they normally would in city or suburban districts (compared with town or rural districts), in districts serving mostly students of color, in districts with a high percentage of English learners (ELs), and in historically low-achieving districts *(Rickles et al., 2021)*. A review found that 20% fewer kindergarteners were on track to learn how to read compared to their peers at this time last year, with the percentage increasing for Black and Hispanic kindergartners *(The74, 2021)*.

20% FEWER KINDERGARTENERS WERE ON TRACK TO LEARN HOW TO READ COMPARED TO THEIR PEERS AT THIS TIME LAST YEAR

In April 2020, preliminary COVID slide estimates suggested students return in fall 2020 with roughly 70% of the learning gains in reading relative to a typical school year. However, in mathematics, students are likely to show much smaller learning gains, returning with less than 50% of the learning gains and, in some grades, nearly a full year behind what we would observe in normal conditions *(Kuhfeld & Tarasawa, 2020)*. In addition, from an April 2021 survey of 1,061 school and district leaders and teachers from the EdWeek Research Center, 42% said they expected that more students would repeat a grade than would have done so before the pandemic. Nearly 7 in 10 said that more students would have to retake a course *(Gewertz, 2021)*.

JUVENILE AND ADULT JUSTICE FACILITIES

Datacasting has the potential to support learning in justice facilities, where security concerns and technology constraints limit access to the internet. Datacasting can provide digital-rich teaching and learning resources to incarcerated individuals while addressing justice facilities' security concerns. Datacasting also has the potential to connect the students more seamlessly to their sender school while the student is detained, thus limiting learning loss time. In sum, datacasting has the potential to bring coherence to the learning experiences for those in the juvenile system as well as for those learners that need to be remote.

42% SAID THEY EXPECTED THAT MORE STUDENTS WOULD REPEAT A GRADE

DATACASTING AS A SOLUTION

Datacasting can provide a solution to the core issues of the digital divide discussed previously—closing the homework gap, mitigating learning loss, and supporting learning in juvenile and adult justice facilities. Datacasting can also provide access to rich content from our public library systems and other resources to help with research. In addition, datacasting can send digital resources and ebooks to parents to engage their youngest of learners. By providing learners with a device as well as access to rich digital educational resources through datacasting, students will be able to complete their school assignments, prevent learning loss by sustaining learning over school breaks—especially over the summer, and support digital-rich learning in justice facilities while remaining cognizant of security concerns.

WHAT ABOUT BROADBAND?

Datacasting will not replace high-speed broadband. Having access to reliable broadband is ideal, but some challenges come with expanding broadband access to all, specifically cost and timing. Many states used federal CARES funding, broadband discounts, and partnerships to mitigate this issue, but these solutions are largely temporary. For example, state efforts to expand broadband access have primarily focused on extending wired and fixed wireless infrastructure to the last mile (The Pew Charitable Trusts, 2020). The last mile is defined as the part of a telecommunications network that connects the local provider to the residential or small-business customer. A challenge that state policymakers are facing in closing the gap in broadband at the last mile stems from the increased cost of deployment for the infrastructure for internet service providers, which is compounded by geography, demographics, and the number and types of entities that provide internet service (The Pew Charitable Trusts, 2020). Therefore, datacasting can bridge these gaps by offering an immediate solution to current access problems.

STUDENTS WILL BE ABLE TO COMPLETE THEIR SCHOOL ASSIGNMENTS, PREVENT LEARNING LOSS BY SUSTAINING LEARNING OVER SCHOOL BREAKS—ESPECIALLY OVER THE SUMMER

3. IMPLEMENTATION PLAN AND RESOURCES

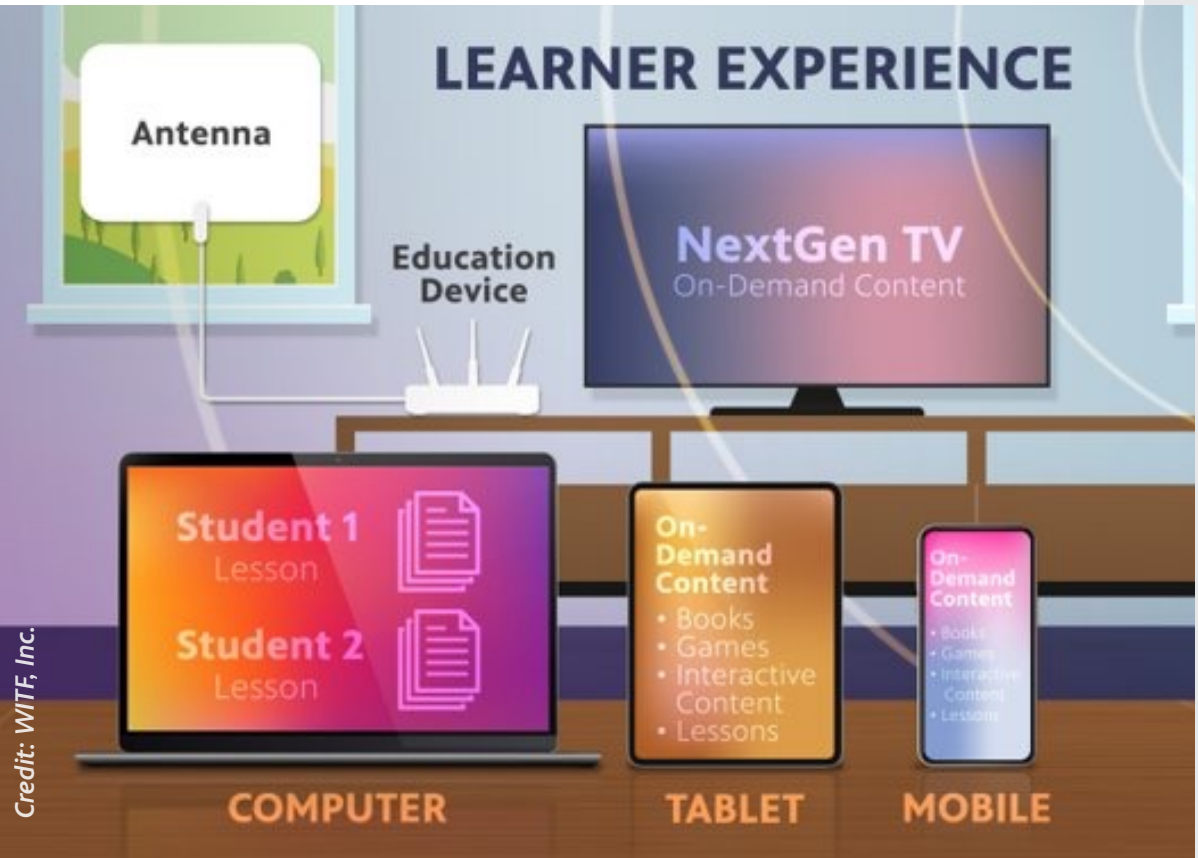
State and district implementation of datacasting can be broken down into four steps: (1) forming a datacasting exploratory and implementation team, (2) securing funding, and (3) pilot program of datacasting.

FORMING A DATACASTING EXPLORATORY AND IMPLEMENTATION TEAM

Forming a partnership between an SEA and PBS member station is critical for generating support for the datacasting program and convening stakeholders. Both the PBS member stations and SEAs of the respective states will have their role in the implementation of datacasting. For example, in Pennsylvania, the PBS member stations work together with PDE to leverage cross-state learning. Educators from PDE offered expertise while PBS member stations developed the Information Equity Initiative's education platform (IEI's education platform.) datacasting interface. PDE also collaborated closely and relied heavily on the expertise of educators and experts in their state system of support and service agencies such as their intermediary units and special education service providers in the implementation and ideation process. As a result, IEI's education platform includes curated Pennsylvania educators. Through the partnership, they share professional development resources and identify the most effective way to support devices in the field.

The SEA and PBS station partnership will identify districts/schools in need of support, work with educators throughout Pennsylvania to connect learners to resources and create a long-term sustainability program. The nature of this collaboration will continue to build positive relationships between PDE and PBS, support best practices in pedagogy, facilitate resource sharing, and offer opportunities to learn strategies for working with students with disabilities.

For example, in Pennsylvania, the PBS member stations work together with PDE to leverage cross-state learning. Educators from PDE offered expertise while PBS member stations developed the Information Equity Initiative's education platform datacasting interface.



Credit: WITF, Inc.

SECURING FUNDING FOR DATACASTING

The recent federal relief packages enacted in response to the COVID-19 pandemic can be sources of short-term funding to support datacasting and distance learning education *(Education Commission of the States, 2021)*. The three main relief packages are (1) the $2.2 trillion Coronavirus Aid, Relief, and Economic Security Act (CARES Act) signed in March 2020, (2) the $900 billion Coronavirus Response and Relief Supplemental Appropriations Act (CRRSA Act) signed in December 2020, and (3) the $1.9 trillion American Rescue Plan Act (ARP Act) signed in March 2021. Each of the relief packages adds funding specifically for distance learning education that can be used for datacasting implementation and scaling into the (1) Governor's Emergency Education Relief Fund (GEER); (2) the Elementary and Secondary School Emergency Relief Fund (ESSER); and (3) State, Local, and Tribal Aid.[1]

GEER Funding. For CARES Act funding, the award must be made within one year and is available through September 30, 2022. Examples of how CARES Act funding has been used include Pennsylvania allocating $15 million to connect students to high-speed internet and remote learning, including funds for a statewide datacasting initiative in partnership with Pennsylvania PBS. For CRRSA funding, the award must be made within one year and is available through September 30, 2023. More than half of the funding is reserved for Emergency Assistance to Non-Public Schools.

ESSER Funding. For ESSER funds, SEAs are required to subgrant at least 90% of the funds to local education agencies (LEAs). All three relief bills support funding distance learning education projects. CARES Act funding is available through September 30, 2022, and funds from CRRSA and ARP are available through September 30, 2023. ESSER funding for distance learning is very permissive, as it can be used for a variety of purposes. However, ARP places some restrictions on how SEAs and LEAs allocate the final pot of ESSER funds by dedicating portions of specific services:

i. SEAs must reserve at least 5% of ARP ESSER funding to address interrupted learning.

ii. SEAs must reserve at least 1% of ARP ESSER funding for evidence-based summer programs.

iii. SEAs must reserve at least 1% of ARP ESSER funding for afterschool programs.

iv. LEAs must use at least 20% of their ARP ESSER funds to address interrupted learning through the implementation of evidence-based interventions, like summer learning, comprehensive afterschool programs, and extended school years.

IN SOUTH CAROLINA, a $1.3 million dollar investment has been made to expand datacasting at SCETV (South Carolina Educational Television), which targets students in 34 school districts.

IN PENNSYLVANIA, Governor Wolf dedicated $8 million in GEER funds to Pennsylvania PBS for datacasting efforts.

In the fall of 2020, the Indiana Department of Education awarded $6.7 million in grants to the Indiana Public Broadcasting Stations (IPBS) to expand educational datacasting services for students who lack broadband connections at home. These funds included the $1.38 million grant awarded through GEERS funding in the summer of 2020 for the initial datacasting pilots conducted in Indiana.

[1] CARES Act funds must be obligated by September 2022; CRRSA funds by September 2023; and ARP funds by September 2024.

Overview of Datacasting Costs

Costs to develop and implement datacasting can be broken down into start-up and ongoing expenses.

START-UP

1. Public television station hardware to support educational datacasting
   - **a. Cost:** One-time costs for transmitter and minimal ongoing maintenance costs
   - **b. Sample Cost:** PA (GEER – $8M) – $750K for hardware for seven stations
2. Learner equipment (educational device and antenna considered one unit)
   - **a. Cost:** Ranges from $100 to $260 per unit (one-time expense)
   - **b. Sample Cost:** IN, PA, and SC – initial devices provided as part of GEER funding
3. Educational platform (educator interface/connection to content)
   - **a. Cost:** Software and cloud platform created by PBS partners and shared across the country
   - **b. Sample Cost:** PA (GEER) – $2.5M one-time cost to develop the new Public Media Education Platform, which will be shared with other states/stations

ONGOING

4. Public television spectrum/bandwidth costs (approximately 1 MB) that are far less expensive than the data rates charged by mobile network operators
   - **a. Cost:** Varies by state/market and will be ongoing
   - **b. Sample Cost:** PA (GEER) – $4.5M for bandwidth across the state to serve an unlimited number of students
5. IEI's educational platform, which includes, which includes incremental costs as teachers are added to support software and cloud storage costs
6. Professional learning/professional development
   - **a. Cost:** Ongoing
   - **b. Sample Cost:** SC part of $2.3M Ready To Learn Grant

PILOTING DATACASTING

South Carolina and Indiana have established pilots to test datacasting. From their pilots, we have learned that datacasting platforms must be fast and easy to use. They should automate and integrate with existing tools such as the Learning Management Systems (e.g., Google Classroom). In addition, they should be accessible for a diverse user base and a wide variety of end-user technology. The platforms will start small and grow as new features are added over time.

South Carolina and Indiana have established pilots to test datacasting. From their pilots, we have learned that datacasting platforms must be fast and easy to use.

Features such as closed captions, text-to-speech, speech-to-text, enlarged type sizes, color contrast, dictionaries, and glossaries should be built into educational hardware and software to make learning accessible to everyone.

4. NETWORK OF SUPPORT

Many states have begun utilizing and implementing datacasting. In response to the growing investments in datacasting, the collaboration that includes AIR, PDE, and PA PBS has launched a CoP with stakeholders from more than 35 SEAs, libraries, and public broadcast stations to discuss best practices and how to address potential hurdles in datacasting implementation. Together with subject matter experts and regional and local educators, the datacasting CoP facilitates bimonthly convenings and provides research-informed policy and practices to support states' implementation of datacasting. The CoP states are working to provide a framework that promotes and expands public media's use of datacasting as an educational resource.

Several organizations and LEAs contribute expert guidance and resources to the datacasting CoP including America's Public Television Stations, Education Week, Education Commission of the States, and the Penn Hill Group. Members of rural, local, and regional education agencies such as Shelby Eastern Schools in Indiana and Dillon School District #4 in South Carolina also contributed lessons learned from their datacasting pilots. In addition, Pennsylvania regional education agency staff from Lancaster-Lebanon Intermediate Unit, Lincoln Intermediate Unit 12, and Tuscarora Intermediate Unit 11 as well as special education consultants from Pennsylvania Training and Technical Assistance Network (PaTTAN) shared best practices for creating digital learning experiences that are accessible to all learners.

Through the datacasting CoP, the states have collaborative conversations and share resources to scale, pilot, and monitor datacasting implementation. The convenings enable members to (1) learn from each other's successes in policy and practice, including communication and roll-out strategies; (2) coordinate among policy leaders, education program experts, and technical experts, both across and within states; (3) share critical questions and barriers; (4) develop methods to evaluate the outcomes and impacts at pilot sites; (5) jointly assess the benefits and risks of datacasting as an educational policy and discuss its applications beyond the current crisis; and (6) discuss datacasting applications beyond the traditional education system. In addition, the CoP seeks to advance work nationally to reach the most underserved and disconnected learners. The CoP is open to all stakeholders interested in learning more about datacasting.

ACCESSIBILITY FOR STUDENTS WITH LEARNING NEEDS

The National Education Technology Plan (NETP) is the flagship educational technology policy document for the nation (U.S. Department of Education, 2017), written by AIR. The NETP articulates a vision of equity, active use, and collaborative leadership to make everywhere, all-the-time learning possible. It also calls upon educators to ensure equity of access to transformational learning opportunities enabled by technology. The NETP further articulates a vision for technology-enabled learning that is equitable and accessible, stating that institutions should develop and implement learning resources that embody the flexibility and power of technology. The plan calls on educators to address both the digital divide and the digital "use" divide so that all students can build, create, design, and become lifelong active learners. In addition, the NETP calls explicitly for more universally designed, accessible, and personalized instruction enabled by technology. Universally designed and accessible technologies can more effectively personalize instruction and offer more flexibility. Features such as closed captions, text-to-speech, speech-to-text, enlarged type sizes, color contrast, dictionaries, and glossaries should be built into educational hardware and software to make learning accessible to everyone.

Collaboration enables states to:

1. Learn from each other's successes in policy and practice, including communication and roll-out strategies;
2. Coordinate among policy leaders, education program experts, and technical experts, both across and within states;
3. Share critical questions and barriers;
4. Develop methods to evaluate the outcomes and impacts at pilot sites;
5. Jointly assess the benefits and risks of datacasting as an educational policy and discuss its applications beyond the current crisis;
6. Discuss datacasting applications beyond the traditional education system.

APPENDIX

State Approaches to Datacasting

SOUTH CAROLINA

South Carolina Educational Television (SCETV) partnered with the South Carolina Department of Education and Department of Education and IEI to explore explore the potential for datacasting technology to support education. Datacasting has enabled SCETV's 11 high-power television transmitters to transmit data to specifically targeted education devices (SCETV, 2020b).

The State of South Carolina allocated nearly $1.3 million from the COVID-19 Response Reserve to expand the state's datacasting capabilities. Through this initiative, approximately 5,000 students across 34 districts will be served. The state has conducted a pilot program in Fairfield, Jasper, and York One school districts (Randall, 2020). During the pilot, SCETV teachers used the newly created ETV Educast platform to send instructional content. According to Governor Henry McMaster, SCETV reaches 98% of households in the state, and any student who can receive SCETV's signal will be able to benefit from the use of datacasting if broadband is not available in their area.

The pilot included content from multiple sources such as SCETV's Knowitall.org (a home-grown site with nearly 9,000 media assets including videos, documents, and interactives) and PBS LearningMedia. There is an opportunity for teachers to add content from other sources (e.g., recorded lectures, SC Learning Object Repository, other online websites) and to customize content for end users based on a number of variables (SCETV, 2020a).

$1.3 million
will serve approximately
5,000 students
across **34 districts**
will be served

INDIANA

Indiana PBS (IPBS) and its member stations, through grants awarded by the State of Indiana, have deployed datacasting to bridge the digital divide for students learning from home (Reed, 2020). Mark Newman, director of IPBS, has secured more than $6 million in grants to begin the pilot program of 8,200 households, in the hopes of ultimately bringing digital education to more than 84,000 Indiana students who still do not have internet access at home (Hickey, 2020).

IPBS began a datacasting pilot in late 2020 with WTIU in Bloomington and used its television signal to support remote-learning programs of Jennings County School Corporation in southeastern Indiana. Teachers used datacasting to send files such as lesson plans, homework, and grades to students who use special equipment to download the materials onto computers, tablets, or smartphones. Through a $1.38M grant awarded in the pilot program, approximately one third of Jennings County's 4,000 students were using datacasting for at-home learning. An additional $5.36M was awarded from the Indiana Department of Education (IDOE) through the CARES Act to expand this initiative to other school districts across the state through the remaining seven IPBS member television stations. The second IDOE award enabled the remaining seven member TV stations to offer datacasting to an additional 7,000 students in their respective viewing areas by the end of January 2021 and provided 1,000 wireless receivers and 1,000 window antennas for those who participated in the initial test. With the state funding, each station has been outfitted with the necessary datacasting equipment to install into its primary broadcast signal. A small portion of each television station's broadcast signal was used to send data including images, video, and school curriculum to students' homes through their Wi-Fi-enabled laptops, smart phones, and tablets (Lakeshore Public Media, 2020).

$6 million
in grants to begin
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PENNSYLVANIA

The Wolf Administration dedicated $8M from the Governor's Emergency Education Relief (GEER) Funds to PA PBS to establish a statewide datacasting initiative. With this support, stations built IEI's education platform, launched Learning at Home, and started to deploy datacasting through a number of pilots. PA PBS is implementing datacasting capabilities for the seven-station public TV network to support distance learning in partnership with PDE (Fast, 2020).

PA PBS is working with the 29 Intermediate Units and school districts across the state to curate the data instructional units (PA PBS, 2020b). Pennsylvania PBS is working with PA education stakeholders to bring brand familiarity to implement the datacasting pilot. Content from offline learning management systems and from public media libraries are some of the are some of the instructional units that are used to datacast to students. There is also opportunity to add content from other sources (e.g., recorded lectures, other online websites) and to customize content for end users based on a number of different variables (PA PBS, 2020a). The pilot explored the amount of time it takes for files to be transmitted over the encrypted signal to a student laptop. In addition, the pilot also determined what students will see when they receive the files on their laptop, best practices for end-user equipment and instructional unit creation. Discussions are also ongoing about models for returning completed work/assignments to a teacher (e.g., text, email, QR codes) if a student has access to a mobile phone or a slow or data-capped internet plan.

Credit: Stephanie Miller

PA PBS is working with the 29 Intermediate Units and school districts across the state to curate the data instructional units

REFERENCES

Atteberry, A., & McEachin, A. (2021). School's out: The role of summers in understanding achievement disparities. *American Educational Research Journal*, 58(2), 239–282. https://doi.org/10.3102/0002831220937285

Auxier, B., & Anderson, M. (2020, March 16). *As schools close due to the coronavirus, some U.S. students face a digital "homework gap."* Pew Research Center. https://www.pewresearch.org/fact-tank/2020/03/16/as-schools-close-due-to-the-coronavirus-some-u-s-students-face-a-digital-homework-gap/

Basu, T. (2020, October 13). Why the "homework gap" is key to America's digital divide. *MIT Technology Review.* https://www.technologyreview.com/2020/10/13/1010243/jessica-rosenworcel-homework-gap-key-to-americas-digital-divide/

Bauer, J. M., Hampton, K. N., Fernandez, L., & Robertson, C. (2020, October 20). *Overcoming Michigan's homework gap: The role of broadband internet connectivity for student success and career outlooks* (Quello Center Working Paper No. 06-20). SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3714752

Betebenner, D. W., & Wenning, R. J. (2021). *Understanding pandemic learning loss and learning recovery: The role of student growth and statewide testing.* Center for Assessment: National Center for the Improvement of Educational Assessment. https://files.eric.ed.gov/fulltext/ED611296.pdf

Chandra, S., Chang, A., Day, L., Liu, J., McBride, L., Mudalige, T., Weiss, D., & Fazlullah, A. (2020). *Closing the K–12 digital divide in the age of distance learning.* https://www.commonsensemedia.org/sites/default/files/uploads/pdfs/common_sense_media_report_final_6_29_12-42pm_web_updated.pdf

Education Commission of the States. (2021, March 31). *Response to request for information summarizing federal relief for K-12 education to support datacasting and distance learning.* https://www.ecs.org/wp-content/uploads/State-Information-Request-_-Federal-K-12-Aid.pdf

Entwisle, D. R., Alexander, K. L., & Olson, L. S. (2001). *Keep the faucet flowing summer learning and home environment.* American Educator, 25(3), 10-15.

Fast, A. (2020, September 24). *Pennsylvania PBS pilots datacasting's capabilities for at-home learning*. Current. https://current.org/2020/09/pennsylvania-pbs-pilots-datacastings-capabilities-for-at-home-learning/

Gewertz, C. (2021, May 24). Tens of thousands of students may have to repeat a grade. Should they? *EdWeek.* https://www.edweek.org/leadership/tens-of-thousands-of-students-may-have-to-repeat-a-grade-should-they/2021/05

Hampton, K., Fernandez, L., Robertson, C., & Bauer, J. M. (2020). Broadband and student performance gaps. *SSRN Electronic Journal.* https://quello.msu.edu/wp-content/uploads/2020/03/Broadband_Gap_Quello_Report_MSU.pdf

Hickey, M. (2020, November 16). *Indiana tests out datacasting technology bringing e-learning to students without internet access.* CBS Chicago. https://chicago.cbslocal.com/2020/11/16/indiana-tests-out-datacasting-technology-bringing-e-learning-to-students-without-internet-access/?amp

Jacobson, L. (2021, March 15). *12 months after pandemic closed schools, 12 million students still lack reliable internet*. The 74. https://www.the74million.org/article/12-months-after-pandemic-closed-schools-12-million-students-still-lack-reliable-internet/

Kelley, B., & Sisneros, L. (2020, December 9). *Broadband access and the digital divides*. Education Commission of the States. https://www.ecs.org/broadband-access-and-the-digital-divides/

Kuhfeld, M. (2019, June 6). Rethinking summer slide: The more you gain, the more you lose. *KappanOnline.* https://kappanonline.org/rethinking-summer-slide-the-more-you-gain-the-more-you-lose/

Kuhfeld, M., & Tarasawa, B. (2020). *The learning curve: Revisiting the assumption of linear growth across the school year.* NWEA Research. https://www.nwea.org/content/uploads/2020/05/Collaborative-Brief_Covid19-Slide-APR20.pdf

Lakeshore Public Media. (2020, December 9). *Lakeshore partnering with IPBS to roll out datacasting.* https://lakeshorepublicmedia.org/blog/2020/12/09/lakeshore-public-media-partnering-with-indiana-public-broadcasters-to-roll-out-datacasting-to-aid-at-home-learning/

McEachin, A., & Atteberry, A. (2017). The impact of summer learning loss on measures of school performance. *Education Finance and Policy,* 12(4), 468–491. https://doi.org/10.1162/edfp_a_00213

Nemer, D. (2015). From digital divide to digital inclusion and beyond. *The Journal of Community Informatics,* 11(1). https://doi.org/10.15353/joci.v11i1.2857

PA PBS. (2020a). *Datacasting.* https://pennsylvaniapbs.org/learning-at-home/datacasting/

PA PBS. (2020b, September 14). *PA Department of Ed, PA PBS bring school curriculum to homes without internet.* BCTV. https://www.bctv.org/2020/09/14/pa-department-of-education-and-pa-pbs-bring-school-curriculum-to-homes-without-internet/

Pew Research Center. (2021). *Demographics of internet and home broadband usage in the United States.* https://www.pewresearch.org/internet/fact-sheet/internet-broadband/

Public Policy Associates. (2020). *Digital equity for students and educators.* National Education Association. https://www.nea.org/sites/default/files/2020-10/NEA%20Report%20-%20Digital%20Equity%20for%20Students%20and%20Educators_0.pdf

Randall, J. (2020, September 9). *Governor unveils new education initiative using "datacasting" technology in collaboration with SCETV.* FOX Carolina. https://www.foxcarolina.com/news/governor-unveils-new-education-initiative-using-datacasting-technology-in-collaboration-with-scetv/article_bfef6ad0-f2a9-11ea-867b-1bbdc9be7612.html

Reed, C. (2020, November 21). *Indiana among 1st to close e-learning gap with datacasting.* IPBS. https://ipbs.org/2020/11/21/indiana-among-1st-to-close-e-learning-gap-with-datacasting-3/

Rickles, J., Hodgman, S., Carminucci, J., & Garet, M. (2021). *District concerns about academic learning during the COVID-19 pandemic.* American Institutes for Research. https://www.air.org/sites/default/files/research-brief-covid-survey-district-concerns-june-2021.pdf

SCETV. (2020a). *Datacasting*. https://www.scetv.org/education/services-school-districts/datacasting

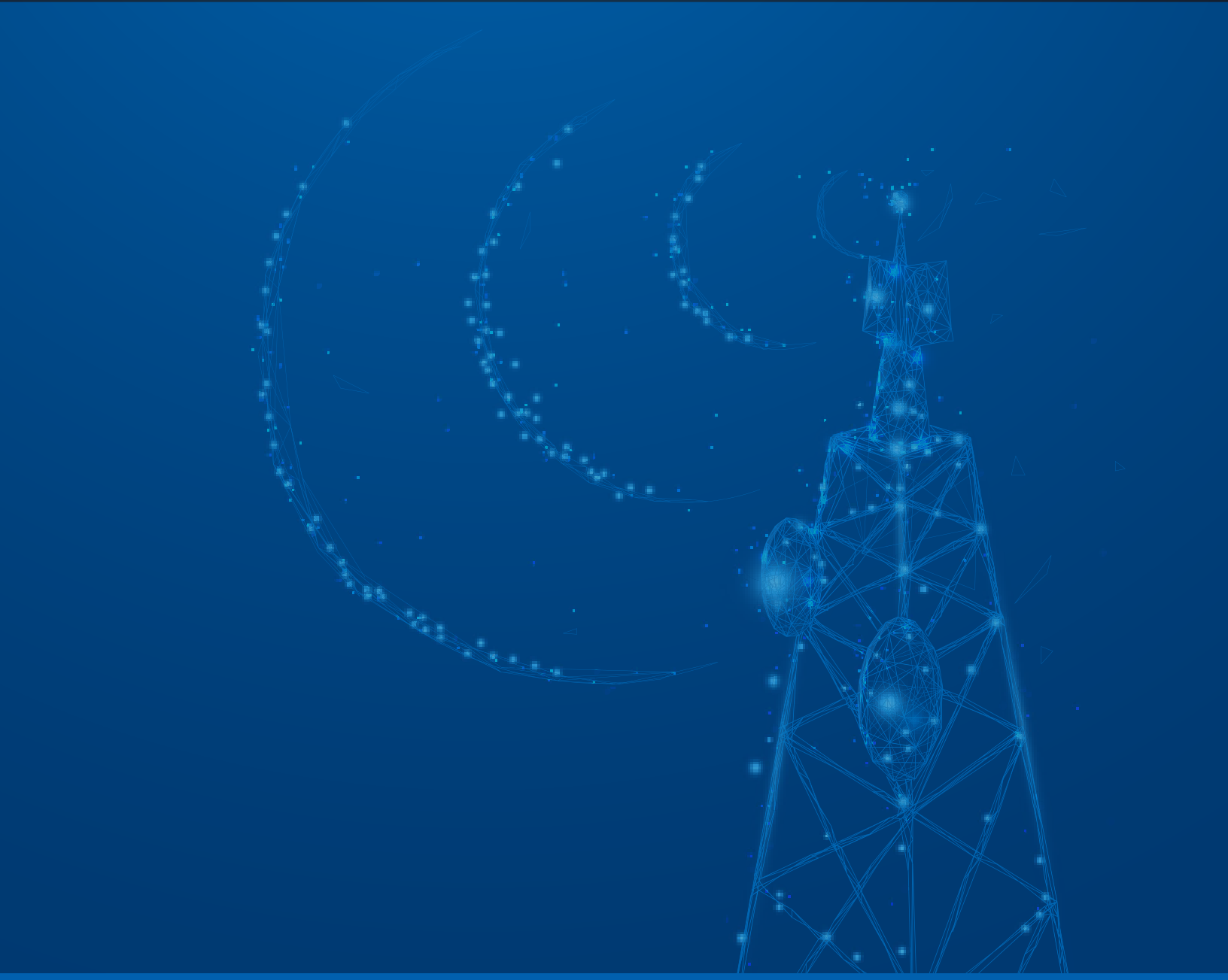
SCETV. (2020b, September 9). *South Carolina ETV to explore use of datacasting technology in education*. https://www.scetv.org/stories/2020/south-carolina-etv-explore-use-datacasting-technology-education

Tate, E. (2021, January 27). *The digital divide has narrowed, but 12 million students are still disconnected.* EdSurge. https://www.edsurge.com/news/2021-01-27-the-digital-divide-has-narrowed-but-12-million-students-are-still-disconnected

The Pew Charitable Trusts. (2020). *How states are expanding broadband access.* https://www.pewtrusts.org/-/media/assets/2020/03/broadband_report0320_final.pdf

The74. (2021, February 26). *As the pandemic drags on, kids' reading continues to suffer*. Giving Compass. https://givingcompass.org/article/as-the-pandemic-drags-on-kids-reading-continues-to-suffer/

U.S. Department of Education. (2017). *Reimagining the role of technology in education: 2017 National Education Technology Plan Update.* Office of Educational Technology. https://tech.ed.gov/files/2017/01/NETP17.pdf



FOR MORE INFORMATION CONTACT:

American Institutes for Research
Bobbi Newman: bnewman@air.org

Pennsylvania Department of Education
Judd Pittman: c-jpittman@pa.gov

WITF, Inc., Pennsylvania
Ron Hetrick: ron_hetrick@witf.org

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