CAL MATTERS

Part 1

The wires may be there, but the dollars aren't: Analysis shows why millions of California students lack broadband

by Jackie Botts and Ricardo Cano
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Mario Ramírez Garcia, 10, listen as his teacher addresses the class during distance learning in the bedroom he shares with his sister on April 23, 2021. According to their father, the internet connection at their Oakland home cuts out about twice a week, which is especially frustrating to the kids when they are taking tests. Photo by Anne Wernikoff, CalMatters

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About twice a week, the $9.99 per month internet connection falters. It's often as Mario Ramírez finally wrangles his kids into their seats — the fourth-grader studies in the bedroom he shares with his 12 year-old sister, who studies in her parents' bedroom — in time for virtual class. The screens freeze — sometimes during online tests. At times the little one bursts into frustrated tears as they wait for their connection to resume, precious class time slipping away.

Though he hides it from his kids, Ramírez' frustration spikes too, along with fear: What if this is the year that his kids lose interest in their education? In Ramírez' view, it's their ticket to a life unburdened by the monthly rent panic that Ramírez has often faced since immigrating from Mexico nearly 30 years ago.

"Sometimes I wonder, 'Will my kids be unable to get ahead?'" Ramirez said in Spanish.

Depending on a student's access to reliable internet, the last year of virtual school has ranged from enriching to impossibly discouraging.

Which kids have access follows a stark pattern: Across urban and rural areas alike, public schools with more students in poverty were far more likely to serve households that lacked a basic broadband connection at home in the months before school went online, according to an unprecedented CalMatters analysis. For the vast majority, the barrier to access was not a lack of internet infrastructure — indicating that the more common obstacle was affordability. But for the state's small population of rural students, those two obstacles unite, leaving three in ten households without a reliable connection.

Though schools have scrambled to deliver laptops, tablets and hotspots to students, and promoted low-income internet plans offered by telecom companies like AT&T and Comcast, one in five California households with K–12 students told the Census Bureau in late March they don't always have the internet access needed for virtual school. Interviews with over 30 students, teachers, researchers, advocates and education leaders revealed that hotspots and discount broadband are often unreliable, leading to a year of education disrupted by screen freezes, distorted audio, and getting booted out of Zoom classes.

https://youtu.be/vkyiyNL-pZM Bad Internet Connection, Video Smithsonian Science Education Center
https://youtu.be/BrxYoaee17o Adequate internet connection, Video Smithsonian Science Education Center

The COVID-19 pandemic brought California's digital divide out of the shadows and to the forefront of public policy. Families sued school systems and the state for failing to provide poor, Black and Latino students equal access to high quality education online. Education leaders argued that logging on at home will be part of a 21st century K-12 education. Lawmakers are now calling internet access a basic civil right.

"We need to envision being able to provide affordable, reliable internet for all like we provide water and electricity," said Assemblymember Al Muratsuchi, a Democrat from Torrance, during a recent webinar about closing the broadband divide.

With billions of dollars in federal relief money flowing into California — and the potential for billions more from President Joe Biden's $2 trillion infrastructure plan — state policymakers have readied at least 20 proposals aiming to close California's digital divide once and for all. At stake is the chance to narrow long-standing achievement gaps that got even worse during the pandemic between internet haves and have-nots.

Deep disparity before pandemic

The Ramírez family had neither broadband nor computers until schools shut down last spring. Their charter school loaned them two laptops, but they never received a hotspot, so Ramírez signed up for their current $9.99 Internet Essentials plan with Comcast for low-income households.

"If we had to pay the regular price, we wouldn't get it because it's too expensive," said Ramírez, who receives Social Security because of a kidney illness for which he must do dialysis five times a week. His wife cleans houses, though fewer clients call since the pandemic.

But the $9.99 plan still cuts out too frequently, Ramírez said. The kids' grades are slipping, especially his son, also named Mario. Before the pandemic, little Mario was a buoyant kid whose afternoons and weekends brimmed with soccer, swimming, karate, and track and field. Now Ramírez struggles to unglue his son from video games or his cell phone, sometimes baiting him with ice cream just to get him out of the house. Ramírez' son has put on weight, which his mom attributes to anxiety.

"I feel more bored. I feel like there's no world left and it's only me and my sister because there's no one here," the fourth-grader said.

Little Mario's teacher has suggested he may need to repeat fourth grade.

Mario Ramírez Garcia, 10, and his father Mario Ramírez sit for a portrait in the Oakland home on April 21, 2021. Ramírez worries that the frustrations his children have experienced this year may lead them to lose interest in their education. Photo by Anne Wernikoff, CalMatters

Monserrat Ramírez Garcia, 12, and her brother, Mario, 10, have a pillow fight in the bedroom they share during their lunch period on April 23, 2021. Both siblings miss going to school in-person and have found it difficult to focus when the internet connection is unstable several times a week. Photo by Anne Wernikoff, CalMatters

The Ramírez' experience is common. Combining data from agencies that oversee telecommunications companies and schools, CalMatters built a public database of broadband adoption and availability estimates in the neighborhoods of most California public K-12 schools. Reporters found that California public schools with the most students in poverty serve neighborhoods in which three in 10 households lacked a broadband connection that could handle the most basic online activities in December 2019.

Meanwhile, in the attendance boundaries of schools with the most affluent students, 88% of households had a connection.

The 20% of schools with the greatest proportion of students getting free and reduced price lunches were compared to the 20% of schools with the least.

"This is just going to have a ripple effect for generations," said Jamey Olney, a Modesto middle school teacher who teaches English to students who are mostly recent immigrants, live in deep poverty, and lacked a home internet connection before the pandemic.

Affordability is a main barrier to access, agreed Carolyn McIntyre, president of the California Cable & Telecommunications Association.

"Based on information available from the Public Utilities Commission alone, we have [about 2.1 million households that could connect to broadband](#), and they don't," she said. Other factors she cited: a lack of digital literacy and language barriers.

"I don't think that the providers have received enough recognition for their voluntary efforts" to provide discounted programs, McIntyre said. But she added, "clearly, as long as we have unserved families that could be connected to the internet, more needs to be done."

Representatives from Comcast Corp., one of the largest internet service providers in the state, contended that a lack of digital literacy, lack of interest, tech skills and devices, as well as language barriers, were more common obstacles than affordability.

> # "This is just going to have a ripple effect for generations."
>
> – *Jamey Olney, Modesto Middle School Teacher*

Sena Fitzmaurice, a senior vice president at Comcast, said the Ramírez' connectivity problems could be due to the devices they are using to connect, where their router is placed or problems like rusted wiring outside the home. She said the speed shouldn't be a problem, citing a study by a research lab [funded by the global cable industry](#) as proof. The study said that at a speed of 50 Mbps download, 5 Mbps upload — the theoretical speed of the Internet Essentials plan the Ramírez family uses — 10 laptops should be able to do video conferencing simultaneously with no problem.

After being contacted by CalMatters, Comcast offered to reach out and send a repair person to the Ramírez family free of charge.

Affordability at root of divide

Barriers to home broadband access generally boil down to two main factors. Has an internet company connected the household to its complex above- and below-ground network of high-speed fiber, copper wires, cables, towers and antenna? If so, is the household able to afford the plan?

Efforts to solve California's digital divide have often focused on the former: funding broadband infrastructure in remote parts of the state. If only we could get telecommunications companies to build out the last miles of high-speed fiber to California's remote communities, we could close the gap, the thinking went.

"Before the pandemic… there's been more attention to deployment issues," said Hernan Galperin, a University of Southern California professor who researches internet policy and digital inequality. "But much less attention to the affordability gap."

Yet CalMatters' analysis, backed up by [a 2019 study from the California agency that regulates internet service providers](#), paints a more complicated picture. Cost stood out as a more common barrier for most California students, in rural and urban areas alike. In other words, even if high-speed broadband were available to every California household, many families wouldn't feel they could afford it.

[A Flourish chart](#)

A [2021 survey](#) by the California Emerging Technology Fund and Galperin confirmed the pattern: 68% of households that didn't have an internet connection cited cost as a principal reason, while 34% said it wasn't available where they lived. Language barriers and limited digital skills also contributed. Nearly a quarter of households that spoke Spanish at home lacked an internet connection.

The average monthly cost for a residential broadband connection plus router in Los Angeles is $59.83, according to research by the [New America](#) think tank. That's not including the average one-time installation and activation fees of $104.75. Nor the fact that most plans offered for under $50 per month increase after the first year or two.

The researchers found that low-income plans, usually priced at $10 per month, tend to be so slow that they cost significantly more for each bit of data than do high-speed plans. Households without Wi-Fi usually [don't know about](#) them. And many COVID-19 broadband [promotions only lasted a few months or expire](#) after the pandemic.

There's no standard definition of what constitutes affordable broadband, unlike housing, which is considered affordable if it costs less than 30% of your income. A December [report](#) from the California Broadband Council, a 12 member committee formed in 2010 under then Gov. Arnold Schwarzenegger to promote broadband deployment in underserved areas, cited research finding that low-income consumers tend to be able to afford $10 to $15 per month plans. New York state just [capped the cost of broadband at $15](#) for low-income people.

There's also no statewide program to help families pay for their internet, unlike [electricity](#). That could change. Two California lawmakers have [proposed](#) a fund to help low-income families cover the cost of high-speed broadband. To pay for it, the state would charge internet service providers 23 cents per month per broadband connection.

> # "The most urgent and widespread problem is lack of competition in the provision of high-speed broadband."
> —Hernan Galperin, USC Professor and Digital Inequality Researcher

In the same vein, the Federal Communications Commission will soon offer [$50 per month vouchers](#) to low-income families, including any with kids who qualify for subsidized lunch. But the program will end when it runs out of funds and depends on internet service providers to sign on.

Multiple advocates, though, said these subsidies reward telecom companies for their high rates.

"For the pandemic to just be a windfall for those that provide digital devices and internet connectivity — there's something that feels very immoral about that," said Angelica Jongco, an attorney with Public Advocates, a nonprofit civil rights law firm.

Telecommunications companies can charge unaffordable rates because they face little competition, said Galperin, who found that just over half of Californians had more than one high-speed Wi-fi option, in a [January policy brief](#).

"The most urgent and widespread problem is lack of competition in the provision of high-speed broadband," Galperin and coauthors wrote.

That's especially true in low-income neighborhoods and communities of color, according to a [report](#) from the progressive Greenlining Institute last summer. The study found that telecommunications companies compete to provide the fastest connections in high-income neighborhoods, while bypassing neighborhoods with a large percentage of poor and Black residents, which the researchers called "digital redlining."

In response to the criticism that government subsidies reward companies for charging high prices resulting from little competition, McIntyre, representing the cable industry, contended that such programs don't cause internet service providers to stop offering discount programs — and that the telecommunications market already is competitive.

An urban and a rural issue

The pandemic revealed that California's K-12 digital divide is as much an urban issue as a rural issue.

"COVID really showed how wide the crack can be due to poverty," said Tim Taylor, executive director of the Small School Districts Association of California. "It got the leaders together to say this is an issue that is not just rural, but it is about poverty and connectivity."

CalMatters' analysis backs that up. Most students who go to the schools with the lowest neighborhood broadband access live in urban and suburban areas, especially Los Angeles, where UC Los Angeles [researchers](#) estimated that 29% of Hispanic students and 27% of Black students didn't always have internet last fall, compared to 20% for white students.

But rural school neighborhoods — especially where poverty and a lack of infrastructure layer on top of each other — have much lower broadband adoption rates overall.

CalMatters identified nearly 400 school attendance boundaries spread across California's far North, Sierras, Central Valley, Inland Empire and borderlands in which at least half of households lacked a basic broadband plan. Of those households without, about one in three had no broadband options to choose from.

Evelyn Flores is photographed in front of her home in Los Angeles on April 22, 2021. Evelyn was unable to connect to certain websites, including some college application pages, while using the hotspot provided by her school district Photo by Shae Hammond for CalMatters

Take Evelyn Flores and Katya Velasco, two ambitious graduating high school seniors who faced similar challenges to connecting to their classes in very different places.

Flores attends Felicitas and Gonzalo Mendez High School, nestled between the Los Angeles River and Highway 101. Here, just 59% of households have broadband.

Velasco attends Desert Mirage High, an aptly named school in the Coachella Valley, where broadband infrastructure is available to about 76% of households and just 32% had a home connection.

In one sense, Flores was one of the lucky ones. Her family already had a $14.99 per month home internet connection with Spectrum for low-income families. But it wasn't fast enough for Flores and her three sisters to do virtual school and work at the same time — especially when Flores' parents quarantined for three weeks in the family's one bedroom after both contracted COVID-19.

Flores and two of her sisters slept, studied and worked in the living room, competing for connectivity. In virtual classes, classmates told her that her voice warped like a robot when she spoke. She got in the habit of turning her video off to free up bandwidth. Upgrading to a faster internet plan was out of the picture: Her dad lost his supermarket job after his bout with the virus.

Velasco's family can't afford a broadband plan, she said. So for the first month of virtual learning last spring, she relied on the overburdened internet connection of her neighbors. She used her phone hotspot to take her AP exams, hoping she wouldn't run out of data during the hours-long tests.

Then both of the families received multiple Verizon hotspots from their school districts.

Katya Velasco relies on a wifi hotspot provided by Coachella Valley Unified to do her schoolswork but the high schooler says her neighborhood does not get as strong of a connection as others. Photo courtesy of Katya Velasco

The hotspots from LAUSD worked intermittently and only during school hours. The batteries drained quickly. They also wouldn't let Flores connect to certain sites, like some college application websites.

Velasco and her classmates noticed that, in some areas, the Coachella Valley Unified hotspots seemed to grab a weaker connection from nearby cell towers. Velasco's neighborhood was one of them. Oppressive heat and wind often drive local power shutoffs, compounding her connection issues.

Katya Velasco relies on a wifi hotspot provided by Coachella Valley Unified to do her schoolswork but the high schooler says her neighborhood does not get as strong of a connection as others. Photo courtesy of Katya Velasco

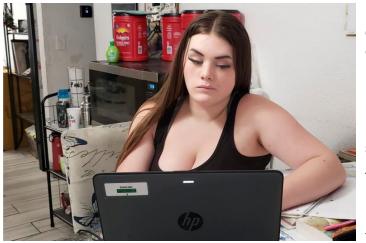Both students described painful class periods trying to keep up with their subjects. On days when Velasco gets kicked out of class repeatedly, she texts her friends to keep her updated, but their summaries are never as good as listening to the teacher.

Despite the challenges, both girls kept their grades up, applied to colleges and got in. Flores is leaning towards CSU Los Angeles, so that she can live at home while saving up for her own place. Velasco will head to UC Irvine, where she wants to study computer science.

But many of Velasco's peers couldn't muster the drive to get through a year of fragmented education, she said. She watched some friends "just completely give up."

Not fast enough

Tenth-grader Kiki Hall lives in a Southeast Fresno home where she often vies for bandwidth with as many as eight other people — four other K-12 students, her mom, her dad and two grandparents.

Kiki Hall does her school work in the kitchen of her Fresno home on April 23, 2021. The 10th grader says she was once kicked out of class 17 times over an 80 minute period due to poor internet connection. Photo courtesy of Samantha Phillips

"Sometimes I just want to throw the computer across the room because it doesn't work," said Hall, who attends Roosevelt High School, which serves neighborhoods in which three in 10 households lacked broadband before the pandemic. Over 90% of students qualify for subsidized lunch.

The family's $43 per month AT&T broadband connection frequently buckles, kicking everyone out of remote classes at the same time. Once, Hall was disconnected from English class 17 times in 80 minutes. By the time the connection stabilized, her teacher was saying goodbye.

Broadband internet, as defined by the FCC, constitutes any connection exceeding 25 megabits per second, or Mbps, to download content online, and 3 Mbps for uploading. California agencies generally use a threshold of 6 Mbps download speed and 1 Mbps upload speed — the standard used in CalMatters' analysis.

"There is no one-size-fits all" speed for remote learning, said Greer Ahlquist, program director for

EducationSuperHighway, a San Francisco-based nonprofit focused on bridging the K-12 digital divide. More people using a connection requires more bandwidth, as does streaming.

"Sometimes I just want to throw the computer across the room because it doesn't work."

— Kiki Hall, fresno tenth-grader

The California School Board Association has urged a new FCC fund for K-12 connectivity to adopt a standard of 25 Mbps for download and 12 Mbps for upload for each student .

For Hall's family that would mean download speeds of at least 125 Mbps. Their current plan is 100. Hall's mom, Samantha Phillips, said she's thinking about switching to a faster $100 Xfinity plan when their AT&T contract ends in September. "We're just going to have to eat the bill," said Phillips who worked with disabled preschoolers before losing her job to the pandemic.

"If it's a necessity, it shouldn't be an unreasonable amount to afford internet so your child can attend school," Phillips said.

Remote school exhausts Hall, who wants to become a professional cosmetologist after college. She seesaws between lacking motivation to log onto another day of remote school riddled with Wi-Fi challenges, and reminding herself it's important to do her best. Sometimes she'll stay up until 2 a.m. to finish an assignment, only to wake up bleary-eyed the next morning for a class that she can't log into.

"It's so frustrating because I'm trying so hard to keep up with my grades enough as it is and these Wi-Fi issues do not help one bit," Hall said. Her grades in math, already her toughest subject, have dropped below C's.

[Gov. Gavin Newsom set a goal](#) last summer of universal access to broadband with download speeds of at least 100 Mbps.

According to CalMatters' analysis, those speeds are nearly universally available for households that attend suburban and urban schools, though they may not be able to afford it. But in rural school neighborhoods, just 68% have access to broadband with download speeds exceeding 100 Mbps.

A Flourish chart

Many students work with far less, whether through hotspots, discount plans or old technology.

Stan Santos, a splicing technician with AT&T and a representative for the Communications Workers of America union, has tested hotspots issued by school districts in multiple small farmworker communities in Fresno County. Most don't get above download speeds of 5 Mbps.

Driving across the Central Valley's vast expanses of farmland, sometimes he happens on a stand of trees and a cluster of concrete brick buildings and trailers that house the families who work in those fields. The concrete blocks cell signal so children will sit outside with hotspots to log onto classes.

Telecommunications companies often don't build out to these areas, Santos said. When they do, they provide copper-based Digital Subscriber Line connections, an older, slower broadband technology. On one splicing assignment, he visited a man living in a trailer in Coalinga, whose discount $10 per month DSL connection wasn't fast enough for both him and his son to go online at the same time, Santos said. So AT&T offered him a faster option, for $40 per month. Still DSL, it didn't top 6 Mbps download speed.

"…I can do nothing to help them."

Even before the pandemic, students without internet at home consistently scored lower in [science](#), [math](#) and [reading](#) — something education leaders called the homework gap.

With the internet at their disposal, curious students are able to continue learning on their own, said Imperial County Superintendent of Schools Todd Finnell, while those without one "get behind in all areas of life."

Even after the pandemic, students who can log on at home will have a big advantage. The pandemic has accelerated the integration of technology into K-12 education. In a recent [national survey](#), 15% of school

districts said they will continue virtual schooling after the pandemic. Another 10% planned to continue hybrid learning.

Remote learning may be especially important in [disaster-prone California](#). Before the pandemic, fire and smoke often interrupted school days in San Mateo County, said County Superintendent of Schools Nancy Magee.

Having online options makes schools resilient to future COVID-19 flare-ups, natural disasters, or even the next pandemic, so "you're not just sending kids home and canceling school for the day."

> # "Like a nurse in a war zone: "They're bleeding out, but I'm behind the fence and I can do nothing to help them."
> — *Modesto Teacher Jamey Olney*

It's too early to quantify the ripple effects of distance learning on student learning, but early research shows alarming trends.

A January [study](#) of test scores in 18 California school districts found significant learning loss in both English and math, with low-income and English learner students falling behind faster than others.

Olney, the Modesto English teacher, says that for her middle schoolers, distance learning has included little learning.

She has students who never got a hotspot, or live in households with three families all sharing a single one. She teaches middle schoolers who live between multiple relative's homes, often accessing classes from a cell phone in a car, and migrant students unable to log into classes from Mexico. She can only guess at what's going on with the handful of students who log on for just 15 minutes each week with their cameras and mics turned off.

Sometimes she feels like a nurse trying to triage students in a warzone, she said. "They're bleeding out, but I'm behind the fence and I can do nothing to help them," Olney said.

One thing is clear: Having a quiet workplace and a stable internet connection [makes a big difference](#). In December, a cohort of around a dozen of her highest-needs students began physically coming to the school to log onto Zoom classes in the morning and get one-on-one homework assistance in the afternoons.

Those who came to school improved their GPAs by at least 1.5 points within two months, on average. Among those who stayed home, most continued hovering around D's and F's.

But Olney warns that getting all kids internet access isn't nearly enough. Not for her students who watch over five younger siblings and cousins also doing distance learning while their parents hold down

multiple jobs, nor for the students who log in from unconditioned trailers in 110 degree heat — yet "they continue to show up," Olney said.

"I think we have a lot to make up to these students."

Mario Ramírez Garcia, 10, leans back while his teacher addresses the class during distance learning on April 23, 2021. Mario says distance learning was "kind of weird in the beginning" but after more than a year of attending class from home, "now it feels normal." Photo by Anne Wernikoff, CalMatters

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