Learning together:

Adapting methods for family and community research during a pandemic

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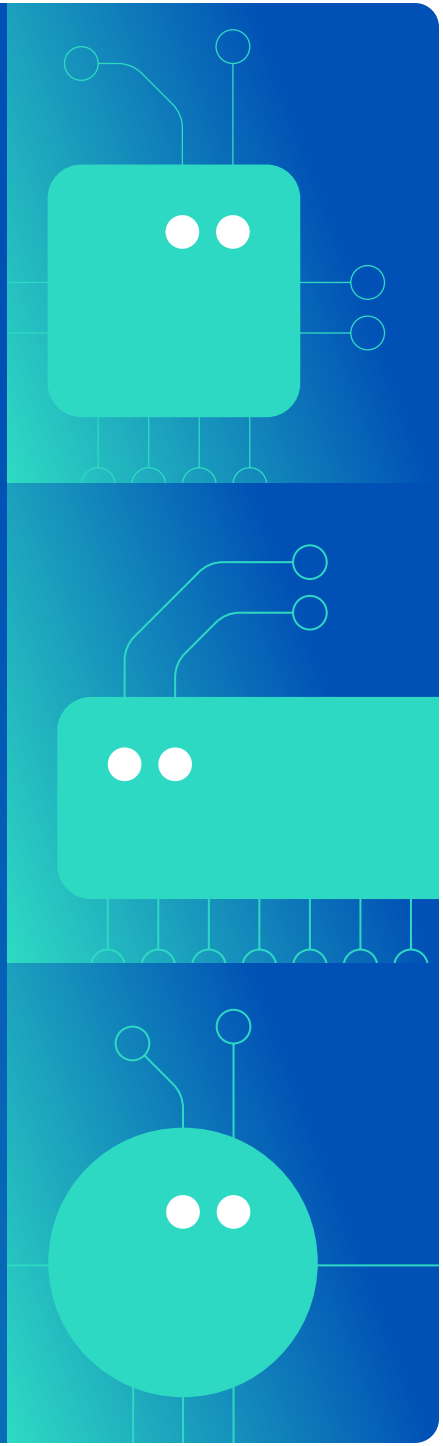
The Joan Ganz Cooney Center at Sesame Workshop



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Brigid Barron, PhD is a Professor of Education and the Learning Sciences at Stanford's Graduate School of Education. Her research investigates the dynamics of learning ecologies with a focus on how digital technologies can serve as catalysts for collaborative and interest learning at home, school, and in the community with the goal of creating more equitable opportunities for the development of expertise and interest-driven learning.

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Background

Not since the influenza pandemic of 1918 has the K-12 American school system shut down as entirely or as abruptly as it did in March 2020, leaving millions of students and their families to figure out how to do school at home. And while COVID-19 emerged well into the information age, an era marked by the development of technological tools that have revolutionized the way we work, communicate, and learn, we still found ourselves tragically unprepared to carry on what once happened in K-12 classrooms and on college campuses. The spring shutdown sent teachers scrambling to deliver their lessons entirely online, too often to students who lacked either the hardware or bandwidth to meaningfully participate in these lessons.

The transition was challenging for all, if not devastating for students from populations disproportionately affected by COVID-19, including Black, Latinx, and lower-income families. Researchers across a variety of disciplines recognized the urgent need for understanding how this global "experiment" in home schooling is altering student learning, as well as students' physical and emotional health, family dynamics, and teacher preparation and support, among many other things. And private, corporate, and government funders, in turn, responded by investing in such research as a means of ensuring the success and prosperity of an entire generation of students affected by the pandemic, acknowledging the need to reevaluate and reimagine formal education as we know it today.

In response to the COVID-19 pandemic, the National Science Foundation (NSF) mobilized funding from its FY2020 budget and supplemental appropriations through the Coronavirus Aid, Relief, and Economic Security (CARES) Act. On March 5, 2020, NSF issued a Dear Colleague Letter (NSF 20-052) announcing its acceptance of proposals "to non-medical, non-clinical-care research that can be used immediately to explore how to model and understand the spread of COVID-19, to inform and educate about the science of virus transmission and prevention, and to encourage the development of processes and actions to address this global challenge" (National Science Foundation, 2020). Interested investigators were encouraged to apply through the NSF's Rapid Response Research (RAPID) funding mechanism, "a fast-tracked grant process to accelerate critical discoveries" (National Science Foundation, 2021).

Investigators could request up to $200,000 and one year to complete their research. Hundreds of researchers responded to the call for COVID-19 related proposals, and as of January 19, 2021, NSF made 801 separate awards amounting to $208,132,911 across six directorates (National Science Foundation, 2021). No fewer than 100 of these awards funded research that aimed to understand the pandemic's impact on learning and education.[1]

Several large-scale surveys, including two funded by NSF's RAPID COVID-19 program, have documented that students and parents from low-income and marginalized populations are particularly strained by online learning (Aguilar et al., 2020; ParentsTogether, 2020; Pew Research Center, 2020; The Education Trust-West, 2020; University of Oregon CTN, 2020). Dr. Anna Rosefsky Saavedra and team from the University of Southern California Dornsife Center for Economic and Social Research (NSF #2037179), for instance, documented—through their nationally representative online survey of 1,400 U.S. families—that just two-thirds of low-income K-12 students (HH income < $25K) had access to laptop/desktop computers and/or the internet at home shortly after U.S. schools closed in April 2020, compared to more than 90% of students from middle and upper-income families (HH > $50K) (Polikoff et al., 2020). Drs. Jennifer Hamilton and Debbie Kim of NORC (NSF #2030436) employed both a nationally representative sample of 2,036 students ages 13-17 and a learning management system serving approximately 2.5 million high school students nationwide, studying the extent to which the COVID-19 pandemic may be further narrowing the STEM pipeline for high school students with inadequate technological resources at home (NORC, 2020). Findings from these and other studies (e.g., Kuhfeld et al., 2020) may help quantify the magnitude and variability of the formal educational experiences of U.S. students during the pandemic and, in doing so, inform important policy decisions around school closures/reopenings and the provisioning of technology to support distance learning, among many other things. However, finer-grained, qualitative approaches are often needed for interpreting broad trends revealed through survey research and illuminating solutions for mitigating disparities between less- and more-advantaged families. These approaches may also reveal what's been working for diverse families in their quarantined learning practices, thus providing insights that may result in more effective and equitable practices within formal education settings.

Unfortunately, conducting both ethnographic and controlled studies as researchers once did—in the same physical space as the individuals under study—poses risks to participants and researchers alike for contracting the coronavirus. Researchers have consequently adjusted their methods in order to safely establish the higher-touch and sustained relationships with participants necessary to answer the how and why questions that surveys can fall short of addressing. NSF's RAPID program has invested in several projects involving the use of remote data collection methods to study learning as it has been naturally unfolding during the pandemic. This includes our project—led by Dr. Brigid Barron at Stanford University's Graduate School

1 COVID Information Commons (CIC) provides a searchable database of all COVID-related studies funded by the National Science Foundation at https://covidinfocommons.datascience.columbia.edu/). CIC aims to facilitate knowledge sharing and collaboration across all NSF-funded COVID research efforts (NSF #2028999).

of Education and awarded by NSF's Science of Learning and Augmented Intelligence Program (NSF #2028082)—that proposed not only researching how families are adapting to school shutdowns, but also mobilizing a broader community of investigators who are exploring innovative methods for studying home learning during the pandemic. To launch this community, Dr. Barron's team, along with partners at the Joan Ganz Cooney Center, gathered two dozen researchers from the academic, nonprofit, and technology sectors in a virtual workshop on the use of remote research methods to study learning at home.

In this report, we summarize the strategies and insights generated at our July 2020 workshop so that we may share them among a wider network of researchers, practitioners, funders, and policymakers concerned with achieving more equitable educational outcomes during and beyond the pandemic lockdowns. Specifically, our report aims to:

+ Provide examples of how researchers are repurposing and reinventing qualitative methods for remote contexts with the aim of expanding and improving these methods for future studies;
+ Highlight how families and communities are innovating and adjusting to the pandemic and how these adjustments are shaping learning and wellbeing in unexpected ways;
+ Convey on-the-ground perspectives from caregivers and learners about the challenges of remote learning and inspire solutions to solve them; and
+ Mobilize collaborative efforts for future research and design.

TABLE 1: NSF RAPID projects featured in this report

	Stanford University	University of Washington	University of Michigan
NSF Award No.	2028082	2027525	2028370
Project Title	Using remote diary methods to understand how families navigate emergency-driven homeschooling driven by COVID-19	Understanding family life and the role of technology in the context of COVID-19	How people learn rapidly: COVID-19 as a crisis of socioscientific understanding and educational justice and equity
Principal Investigator(s)	Brigid Barron	Julie Kientz, Alexis Hiniker, Sean Munson, Jason Yip	Angela Calabrese Barton, Elizabeth Davis, Leslie Rupert Herrenkohl
NSF Directorate/ Division/Program	Social, Behavioral & Economic Sciences (SBE) / Behavioral and Cognitive Sciences (BCS) / Science of Learning & Augmented Intelligence (SL)	Computer and Information Science and Engineering (CISE) / Information & Intelligent Systems (IIS) / Cyber-Human Systems (CHS)	Education & Human Resources (EHR) / Division of Research on Learning (DRL) / Advancing Information STEM Learning (AISL)

About the Remote Methods Workshop

On July 17, 2020, we hosted a 2-hour-long Zoom-based workshop featuring three NSF RAPID projects, all of which were studying how the Spring 2020 school closures were affecting family learning and dynamics. Notably, these projects were funded by three different NSF directorates—Social, Behavioral and Economic Sciences (SBE), Computer and Information Science and Engineering (CISE), and Education and Human Resources (EHR)—which speaks to the diversity of theoretical and methodological approaches used in conducting this work (see Table 1). In addition to the principal investigators (PIs) of the RAPID projects, we also invited a small number of researchers whom we knew were also conducting, or about to conduct, learning-related research using remote methods. The full list of workshop participants can be found in Box 1.

To make the most of our brief time together, the three RAPID teams wrote and distributed 2-page summaries of their studies a few days before the workshop to give all participants a general sense of each study's aims, research questions, and methods. We also invited non-presenting researchers to serve as discussants and requested that they come prepared to comment on the focal studies. We spent the first half of the workshop discussing the focal projects as a whole group; the latter half took place in Zoom breakout rooms, where smaller groups could delve into the methodological challenges and opportunities of conducting remote research with families. At the end of the workshop, participants reconvened in a full-group brainstorm of how we might create a more formal alliance around our shared aims and activities as well as advancing scholarship and practice around the study of remote learning.

This report is similarly organized. First, we present the NSF RAPID projects as case studies of three varied approaches to documenting how learning is transpiring in American homes and communities, without compromising the health and safety of either subject or researcher. We next present an analysis of the methods employed by the cases, highlighting their common and unique challenges and opportunities. The report concludes with a set of insights gleaned from across the three studies, which may serve as a guide for researchers interested in conducting similar work. We also believe that educators, policymakers, and educational technology developers will find these insights useful to their decision-making as it pertains to improving learning in a post-pandemic world.

BOX 1: Workshop participants

+ Maria Alvarez, Common Sense Media
+ Sheena Erete, DePaul University
+ Matthew Kam, Google
+ Catherine Jhee, Joan Ganz Cooney Center
+ Kiley Sobel, Joan Ganz Cooney Center
+ Lori Takeuchi, Joan Ganz Cooney Center[2]
+ Michael Preston, Joan Ganz Cooney Center
+ Vikki Katz, Rutgers University
+ Brigid Barron, Stanford University
+ Caitlin K. Martin, Stanford University
+ Cindy Lam, Stanford University
+ Judy Nguyen, Stanford University
+ Rebecca Silverman, Stanford University
+ Rose Pozos, Stanford University
+ Veronica Lin, Stanford University
+ Craig Watkins, The University of Texas at Austin
+ Ricarose Roque, University of Colorado at Boulder
+ Angela Calabrese Barton, University of Michigan
+ Betsy Davis, University of Michigan
+ Day Greenberg, University of Michigan
+ Leslie Rupert Herrenkohl, University of Michigan
+ Tammy Tasker, University of Michigan
+ Jason Yip, University of Washington
+ Julie Kientz, University of Washington
+ Rebecca Michelson, University of Washington
+ Sean Munson, University of Washington

[2] At the time of the workshop, Lori Takeuchi was on staff at the Joan Ganz Cooney Center; Takeuchi is now a Program Director at the National Science Foundation in the Directorate of Education and Human Resources.

Case studies of remote research

STUDY 1

Using remote diary methods to understand how families navigate emergency homeschooling driven by COVID-19 – Stanford University

NSF Award #2028082, Division of Behavioral and Cognitive Sciences, Directorate for Social, Behavioral and Economic Sciences

By Brigid Barron, Caitlin K. Martin, Rose K. Pozos, Cindy K. Lam, Judy Nguyen, Zohar Levi, Susie Garcia, and Veronica Joyce Lin

Background

The speed of transitioning to remote instruction varied enormously from place to place, as did the quality, quantity, and form of home-school connections, raising significant concerns about equity. Parents and other adult caregivers at home were asked to take on new roles as co-teachers and facilitators of remote learning. According to an analysis of the Household Pulse Survey carried out by the U.S. Census Bureau, parents spent an average of 13 hours a week supporting their children's learning during the spring of 2020 (Wang, 2020). Understanding the ways in which families adapted to the challenging conditions of the COVID-19 pandemic is critical to designing better solutions for the future: How did families support their child's learning, and what challenges did they face? What roles did technology play, and what equity issues emerged? What positive outcomes did parents observe? Our analysis foregrounds asset-based perspectives, attending to the resourceful ways that families adapted simultaneously to changes in normal routines and variation in access to resources (Lee, 2010).

The study

Our research team conducted a diary study that captured a diverse set of 109 families' experiences during the first wave of U.S. school closures in the spring of 2020. Leveraging the design of a pre-pandemic pilot study of the diary-study method for examining home learning (Barron et al., 2021), we developed a remote-research approach, allowing parents, over the course of one week, to voice the impact that the COVID-19 crisis while also documenting learning opportunities in their homes over the course of one week.

Methods

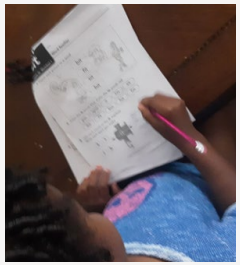
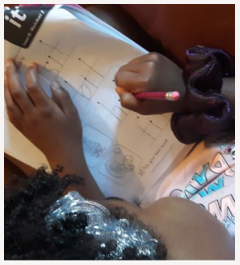
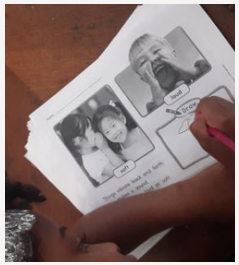
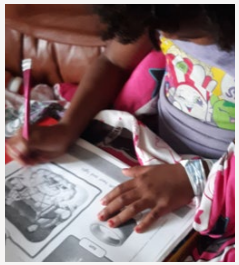
Data collection was enabled by dscout, a smartphone-based qualitative research platform. With the aid of dscout, our research team could interact with families in near real time and collect rich qualitative data without face-to-face contact, affording broader geographic reach and pandemic-safe practices. The approach also has affordances for participants, including mobility and ease of uploading videos and pictures in real time. For example, a busy parent can snap a quick picture of their child doing an activity and upload it while also making dinner or during a break between meetings. Videos taken at home—with background noise from children and pets—provide rich context previously reserved for expensive and potentially intrusive home visits. Participants submitted a total of 1,103 unique entries over the course of the study, responding to researcher questions about five primary topics (see Appendix: Table 6), including 668 "diary entries," which describe learning moments that happened during the week. Each participant submitted a minimum of six diary entries. Each entry included multiple-choice survey items, open-ended text responses, image uploads, and video prompts, as seen in Table 2, which summarizes six diary entries over the course of a week from one of our participants.

Findings

Our team used a variety of analytical methods to explore the data, including: construction of indices reflecting breadth of challenges, diversity of resources used, and perceived learning outcomes; coding open-ended responses and transcripts to capture variation in themes using grounded theory and deductive approaches (see Appendix: Table 7); developing case portraits to help theorize parent-identified examples of learning; and comparative analyses based on demographics and other variables of interest. Here are some of our findings:

+ *Challenges*. Parents described a diverse range of challenges associated with their new roles as co-facilitators of learning. Many struggled to coordinate their own work while also overseeing their child's academic tasks. Caregivers also grappled with pedagogical issues, realizing that they did not know how to teach particular content even when they found the time. Another cluster of concerns emerged around keeping their child engaged and motivated. Many children had a hard time focusing on schoolwork and keeping up with assignments. Finally, more than half of the caregivers described social and emotional concerns (Nguyen et al., 2021). Children missed their teachers and friends, and they worried about meeting academic requirements.

TABLE 2: Data across diary entry submissions from one participant

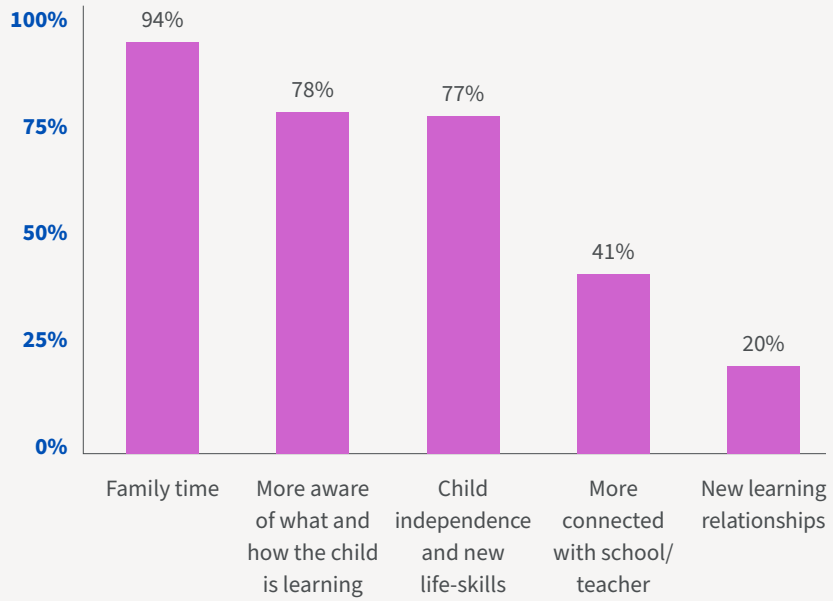
	Monday	Tuesday	Wednesday	Friday	Sunday	Monday
Time	Early afternoon (12-3PM)	Early evening (5-8PM)	Early evening (5-8PM)	Early evening (5-8PM)	Late afternoon (3-5PM)	Late morning (9-12AM)
Origins	School	School	Parent	Child	Parent	Parent
Topic	Writing	Writing	Math	Science	Other: Sounds	Other: Light & heat
Photo						
Researcher summary of parent activity description	Emi writes out words on a worksheet. Mom helps and has Emi "read it over and over again until she's got it."	Emi traces words in the worksheet then matches the word with a picture. Mom helps Emi sound out words.	Frustrated with the school worksheet packet, Mom asks Emi to arrange sticks into pairs to practice counting by 2s.	Emi wonders why she can't hold water. Mom sets up inquiry activity to compare water in liquid and solid forms, supporting sense-making and introducing new vocabulary.	Emi identifies photos of loud and soft sounds in the packet. Mom extends this worksheet activity by banging things around the house and documenting their variation.	Emi identifies photos of sources of light and heat in a worksheet. Mom plans an extension to find things around the house that light up.
Parent rating of learning (0-to-10)	3	5	5	10	10	10
Parent rating of fun (0-to-10)	2	2	10	10	10	10

+ *Parents as learning partners*. Building on learning partner practices identified in earlier research (Barron et al., 2009), we asked parents how they were supporting learning. Sixty percent collaborated with their child, including participating in school assignments and facilitating innovative hands-on projects, and this was similar across income groups. Diary entries surfaced new learning partner roles, such as listening in on synchronous classroom instruction, troubleshooting technology and managing workflow. (B. Barron et al., 2021). Entries also illustrated how caregivers arranged activities supporting engagement and extending what schools could offer.

+ *Technology and equity*. At the time of the study, most school instruction, assignments, and communication with families had moved online across the country. Technology was critical for accessing materials and maintaining social connections. Even within our relatively well-connected sample, children from higher-income families were more likely than those from lower-income families to have synchronous virtual classes (95% vs. 70%), access to video lessons (73% vs. 43%), and personalized communication with teachers (92% vs. 65%) (Pozos et al., 2021).

+ *Positive outcomes*. Parents reported benefits (see Figure 1) ranging from more family time (94%) to closer teacher/parent relationships (41%). Many gained insights about their child's learning (78%). Diary entries documented examples of how observing a child's classroom life sparked new ideas about how to support them. Some caregivers spoke specifically about using new knowledge to provide additional resources tailored to their child's needs. Others reconceptualized preexisting ideas about their child as a learner.

FIGURE 1: Benefits reported during the time when schools were closed



Implications for research

+ *Inspire designs for family engagement based on what worked well and what did not during the early months of the pandemic.* Caregiver observations documented in the diary entries showed that they were attending to their child's feelings, interests, and understanding of content, providing crucial formative assessment data that most teachers are currently lacking and missing terribly. In future design work, tools and practices can be developed that allow caregivers and teachers to share insights about maintaining academic resiliency by building on children's interests and activity preferences, thereby sustaining engagement.

+ *Develop models of remote research-practice partnerships (RPPs) with families, schools, and communities.* Our study centered families as the core unit of analysis. Future research should involve multiple interdependent stakeholders, paving the way for continual improvement of remote and hybrid learning. Beyond schools and families, this work should include community-facing organizations (e.g., libraries, afterschool clubs, health agencies) that support learning (Erete et al., 2020). To contribute to the design of resilient communities facing simultaneous economic, educational, racial, and health-related inequities (Greenberg et al., 2020), it will be essential to design novel approaches that leverage existing learning networks and can honor RPP principles, including mutuality, trust, and co-construction (Coburn & Penuel, 2016).

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Caitlin K. Martin is a senior researcher with Barron's lab at Stanford University and is an independent research and evaluation consultant focusing on out-of- school learning and data visualization.

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Zohar Levy is an undergraduate at Stanford University studying Linguistics with a focus on modern language (Arabic and Spanish).

Susie Garcia is an undergraduate at Stanford University studying Economics and Philosophy with a focus on economic development.

Veronica Joyce Lin is a doctoral student in the Learning Sciences & Technology Design program at the Stanford Graduate School of Education. Her research interests lie at the intersection of learning, young children, and technological and educational equity.

STUDY 2

Education, work, and life during COVID-19: Supporting families at home with technology – University of Washington

NSF Award #2027525, Division of Information and Intelligent Systems, Directorate for Computer and Information Science and Engineering

By Rebecca Michelson, Akeiylah DeWitt, Julie Kientz, Sean Munson, Jason Yip, and Alexis Hiniker

Background

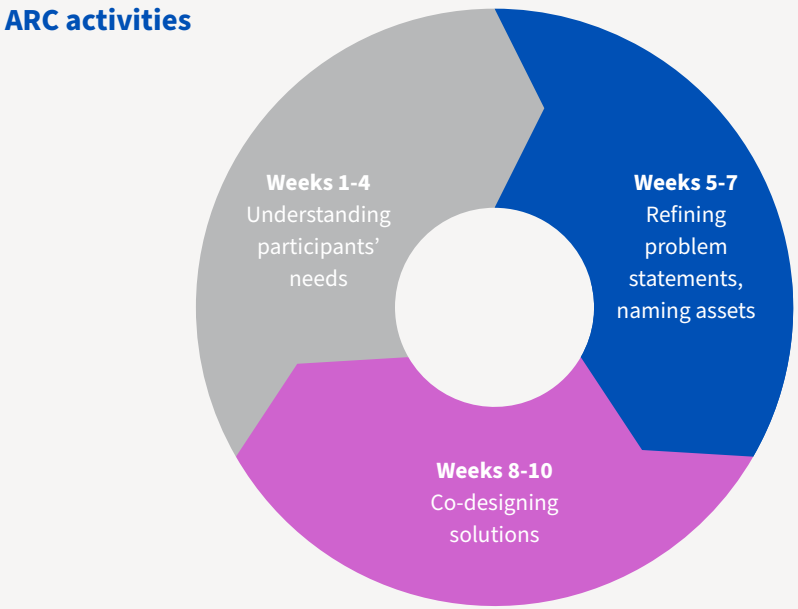
As COVID-19 spread, American families urgently adapted to new ways of working, managing child and elder care, and facilitating remote learning experiences. This research aimed to understand parents' experiences with technology in the home in the wake of millions of families suddenly taking ownership of their children's education, often while working full-time or enduring the hardship of losing employment and seeking alternatives. Technology provided critical infrastructure, and new contexts required everything outside the family unit to now be done remotely while social distancing. We collected data on concerns affecting family life in these extraordinary circumstances through small, weekly activities in a shared online community. Our goals were to identify and share the greatest stressors families faced during these times, and design recommendations for improving everyday family tools such as remote learning technologies. Our research questions for this project included:

+ Question 1: How are the roles of parents evolving during the pandemic? How are families meeting the competing needs of working remotely (if this is an option for them) and caring for children?
+ Question 2. How are families leveraging and adapting technology during this time, and what successes and challenges have they experienced?
+ Question 3. What technology-supported potential solutions do families envision addressing their needs during times of crisis and prolonged social isolation?

The study

Our study applies the Asynchronous Remote Communities (ARC) method, which supports longitudinal engagement with harder-to-reach populations, communities who face stigma, and geographically disparate communities (Bhattacharya et al., 2019; MacLeod et al., 2016). Over 10 weeks, between May and August 2020, we used Slack—an online chat platform used in a variety of business and community organizing settings—to ask families about their home technology needs, to refine their problem statements and identify resources, and to codesign solutions (see Figure 2). With the asynchronous nature of the study, families were able to connect with each other in three distance groupings across time zones, on their own schedules within moderated channels. While the study was planned to unfold over 10 weeks, we paused study activities for one week during the Black Lives Matter uprisings following George Floyd's murder to take time for reflection and learning.

FIGURE 2: Overarching themes of the Asynchronous Remote Community method in this study, consisting of discussion prompts, a diary study, interactive drawing activities, and codesigning sessions



Methods

After conducting nationwide outreach through our extended networks as well as Facebook ads, we enrolled 30 economically and racially diverse families with children ages 3–13 (preschool through 8th grade) and divided them into three groups from a screener with 320 responses (see Appendix: Table 8). The weekly prompts ranged from a diary study to community resource and information mapping to codesign activities, as illustrated in Table 3 on page 15. The Slack group data includes conversation threads, artifacts (i.e., love and break-up letters addressed to technology), and drawings from the codesign activities. During the codesign weeks, we included the Mixing Ideas method, which structures collaboration by encouraging participants to combine their ideas with other participants. Mixing Ideas can be effective in settings where participants may have less confidence or social cohesion; this is because it requires participants to review and build off of each other's work. In fact, many families positively commented on each other's creative contributions and created new ones. Our team also conducted compensated follow-up interviews and coded the data through an iteratively developed codebook and grounded theory methods (Strauss & Corbin, 1997).

TABLE 3: Activities for the 10 weeks of the Asynchronous Remote Communities

Phase	Week	Activity name	Prompt details	Generative or recall
Understanding participant needs	1	Introductions and advice	After introducing themselves, parents were asked to share what advice they would have given themselves pre-COVID-19.	Recall
Understanding participant needs	2	Diary study	Participants completed five different diary entries on their technology use.	Recall
Refining the problems and benefits of technology use	3	Ranking and ranting and writing a letter to technology	Participants reviewed a list of top technology-related concerns and benefits (generated from screener survey responses and the diary study entries). They ranked the concerns and wrote a love or break-up letter to a piece of a technology.	Recall and Generative
Refining the problems and benefits of technology use	4	Information and resource mapping	Participants created diagrams of their information flows and resources related to work needs, remote schooling (or summer/after-school activities), and COVID-19.	Recall
Study pause	5	Study pause	Shortly after the murder of George Floyd, we held a study pause for our participants and research team to reflect and protest accordingly.	Generative
Codesign	6	Ideation	Through partnered brainstorming, participants created solutions to address some of the most chaotic moments of the pandemic.	Generative
Codesign	7	Idea refinement	Participants selected their top ideas and refined them with product names, descriptions, and sketches.	Generative
Codesign	8	Mixing ideas: Round 1	Participants created family technologies about COVID-19, supporting quality family time, addressing anti-racism, or anything else that felt meaningful to them, based on combining ideas shared by others.	Generative
Codesign	9	Mixing ideas: Round 2	Participants completed the “mixing ideas” prompt one more time with the latest batch of ideas shared.	Generative

Findings

+ *Improving remote learning systems*. Families shared many requests to improve remote learning systems and other technologies and to adjust learning expectations. These include refining features that support finding, tracking, and updating school assignments as well as clearly communicating critical information (such as login information, classroom links, and expectations for academic progress). Parents also requested remote learning with more child autonomy, easing the burdens of parental supervision. We anticipate that these needs will persist, even once children return to school.

+ *Equity considerations*. Based on learning about lack of support, we found that children who need extra attention, such as those with learning disabilities, faced the greatest risks of falling behind. Parents of these children reported a greater need to provide consistent supervision during coursework and homework, often at the cost of skipping work or caregiving for others. Another barrier, especially for families in our lower SES group, was limited access to devices at home. One parent told us that her two sons had to share her cellphone to attend class because they did not have any other Wi-Fi-enabled devices.

Implications for research and practice

+ We chose the moderated Asynchronous Remote Communities (such as through Facebook groups, Discord, Slack, etc.) because they enabled quick deployment in a rapidly evolving and uncertain context while maintaining deliberateness with our prompts (MacLeod et al., 2016). For example, we began the study with a concrete plan of initial activities and adapted the prompts as needed based on our pandemic learnings. ARCs also offered space for personal story sharing, learning from others in similar circumstances, and creative explorations. Our team selected Slack over other social media tools because participants could choose to participate anonymously with pseudonyms.

+ The majority of parents we interviewed shared that they enjoyed the experience of taking part in the study and would participate in a study like this again because it offered opportunities for creative brainstorming and fun experiences with reviewing others' ideas. Future ARC themes could also include different stakeholders, such as teachers, parents, and/or learning technology designers, with the aim of building empathy and understanding through facilitated activities and the development of prototypes.

+ While improving technology design might alleviate some of the learning issues families experienced, many of the technological problems encountered were influenced by strategic decision-making, such as standardization of technology use for teachers within a school or district. With the implementation, if possible, of IT support or a technology troubleshooting hotline, schools may gain a better understanding of not only how but also why families experience technology issues.

+ Technology loan programs can address device gaps between less- and more-privileged families, and social worker support can assist with connections to social services (such as navigating SNAP/EBT programs, unemployment benefits, etc.). Special efforts need to be made to accommodate students with Individualized Education Programs and limited device and broadband access for remote schooling.

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STUDY 3

Attending to political and ethical dimensions of remote research methods – University of Michigan

NSF Award #2028370, Division of Research on Learning, Directorate of Education and Human Resources

By Angela Calabrese Barton, Day Greenberg, Leslie Rupert Herrenkohl, Tammy Tasker, Elizabeth A. Davis, Chandler Turner, Devon Riter, Francisco Para Camacho, Denise Jones, and Peter Siciliano

Background

In long-term research-practice partnerships (RPPs) in the Midwestern and Western United States, we sought to understand what/how community partners learn about and take action on COVID-19 and justice-related concerns. Our overarching research questions include:

+ How and what science do people learn about COVID-19?
+ How do people activate and apply the science they learn to make (or revise) personal and family decisions?
+ How is youth and adult learning about COVID-19 shaped by individuals' critical consciousness around racial, educational, and economic justice?

As we sought to answer these questions, we further considered the political and ethical dimensions of doing research through remote methods.

We draw upon theories of consequential learning, focusing on what counts as valued learning, as well as how the processes of learning involve disrupting or transforming normative patterns of participation towards new forms of expertise and social

relations that counter ahistorical and universalist notions of knowing (Gutiérrez et al., 2019). Consequential learning reveals how learning matters to people both here and now and in imagined social futures. It also illuminates power dynamics in how actors are positioned across time, place, and scales of activity (Jurow & Shea, 2015). To attend to power in our remote methods, we further draw upon critical witnessing and being with—practices toward conscientization, social transformation, and the public good of communities historically marginalized by systemic inequities. We seek to amplify possibilities for coalition building and learning in "daily, (extra)ordinary, and intentional" work (Villenas, 2019, p. 153).

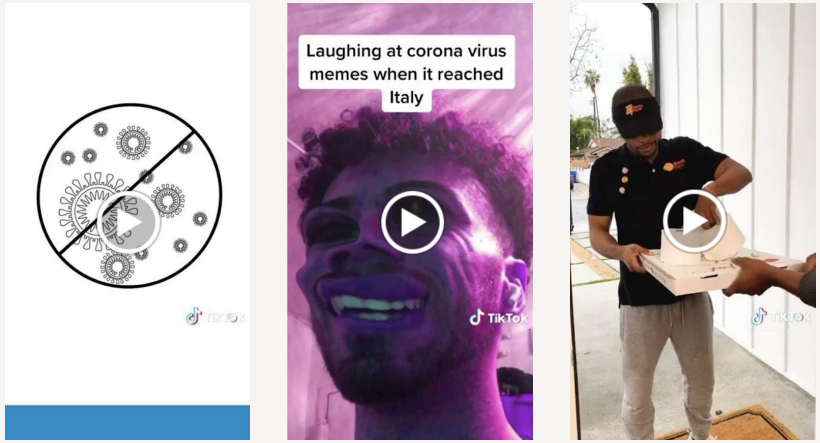
Methods

This larger study involves 60 participants across two metropolitan areas representing different U.S. geographic regions (see Appendix: Table 9). We used both remote participatory interviewing and informal conversations with experience sampling methods, as outlined in Table 4 below. Methods took shape interactively as we partnered with participants to cogenerate data over time through a multimodal and dynamic data cogeneration design.

TABLE 4: Remote methods

Approach	Generation	Focus	Remote methods equity considerations
Dialogic interviews	4 interviews/participant, 90-240 minutes each	What COVID-19 information individuals access/ apply towards decision-making, how, and why; Personal/community COVID-19 experiences; Use of resources and social networks; Critical political awareness, clarity; action taking	Range of tools: phone, video conferencing, text Range of contexts: One-on-one to whole family Co-strategizing interview times/days/structures (e.g., breaking up interviews over separate days if needed) Co-constructing timeline using multi-modalities
Informal conversations	Organic spillover from interviews led by participants	Share their complex and layered stories in multimodal ways, giving depth to each of the layers, while also capturing interactions among layers	Critically being with and witnessing over time via informal texting, social media link sharing, photo/video and meme sharing
Experience sampling method	Monthly Google surveys, sent to participants via text and/or email with brief reminders to share any relevant updates	What updates participants experience between interviews	Asynchronous opportunity to bear witness and to continue centering participant voices over time Personal reflections, social media link sharing, photo/video and meme sharing, narrative-building

FIGURE 3: Experience Sampling: Examples of TikTok videos uploaded by participants



Our long-term relationships framed and mediated our data cogeneration. We built relationships of trust and shared vulnerability in our research-practice partnerships over years or decades, which laid a foundation for us to develop the multi-modal and organic elements of our design. We co-analyzed data with participants using critical inquiry/grounded theory, in a constant comparative, continuities/contradictions approach (Charmaz, 2017). Initial coding categories for our grounded work are outlined in Table 10 of the Appendix.

Our approach is shaped by our efforts to unlearn, relearn, and remix research tools we have used in the past, towards opening up possibilities for being with/critical witnessing as a part of this research process turned remote. For example, we met with long-term partners via text and phone calls to co-strategize what methods youth/families are comfortable using and/or learning, as well as when, how, and for what purposes (e.g., co-planning for a video-based dialogue during family dinner). We also used remote methods to meet research and life needs, such as collaboratively sewing masks and coordinating supply sharing/distribution during video-based interviews.

Findings

We share our insights thus far in three separate papers on the topic of how people's learning is shaped by justice concerns and social context during a time of crisis. These papers address *community infrastructuring* (Greenberg et al., 2020), critical data practices (Calabrese Barton et al., submitted), and the role of trust in building knowledge and taking action (Herrenkohl et al., in preparation).

First, participants came together to co-create new data-constructing and data-sharing infrastructures that could better serve their needs as they continued to learn the science of COVID-19 and its equity-related complexities (e.g., Greenberg et al., 2020). By community infrastructuring, we mean justice-oriented acts of necessity for community protection and wellbeing; these acts involve sharing and reorganizing resources in the moment and with an eye towards the urgent near future. Participants highlighted conflicts between sources and messaging, where and how they saw their own experiences mirrored/challenged in such messaging, and the extent to which these data could possibly inform/transform their decisions and actions.

Using multimodal forms of information sharing with us, participants pointed out how misinformation campaigns fostered deepening racial and socioeconomic injustices and what that meant for their own practices.

Second, participants' enactment of critical data practices changed how they negotiated between coming-to-know and coming-to-act (Calabrese Barton et al., 2021). Community-engaged critical practices are what people do in socially-mediated and culturally-embedded ways with, in relation to, and oriented around data and data infrastructures in support of more equitable everyday living and communities (Milan, 2019). These practices involved youths' efforts to recognize and leverage their intellectual power to participate in and challenge real and consequential aspects of everyday living and learning in a pandemic as STEM-agentic people. These practices arose from tensions in their engagement with data as they mobilized big and small data from different epistemological and social origins towards meaning-making, action-taking, and communicating. These tensions shaped how and why youth critically navigated, leveraged, and critiqued big data to create meaning. For example, youth remixed, recontextualized, and repositioned big data through the lenses of small data as they sought to bring provenance, utility, and visibility to their meaning-making. They engaged these practices towards liberatory effects in how they navigated and reimagined data regarding their hoped-for worlds. Youth not only reimagined data as sites of struggle over what and who counts in the developing data-rich narrative of COVID-19 and its intersections with justice-related concerns, but they also enacted alternative infrastructures for counter-data production and aggregation towards justice in both the here-and-now and possible futures.

Third, participants' coming-to-know and coming-to-act were mediated by issues of trust in relation to what one knows and seeks to know, as well as who one is in relation to the community (Herrenkohl et al., in preparation). Cognitive models of learning suggest that constructing strong foundational knowledge about COVID-19 leads to adopting practices, such as mask wearing, for preventing viral spread. This approach fails to recognize the role of culture and context in shaping these practices. For instance, early in the pandemic, we found that Asian- or Asian American-identifying participants who brought prior knowledge/experience with other pandemics and the practice of mask wearing quickly understood that the practice of mask wearing is helpful for preventing viral spread in the community. Yet, some participants reported not wearing masks early in the pandemic because mask wearing was then interpreted as an indication that "I am sick" rather than "I am being responsible community member." We found that although participants built scientific understanding from trusted sources and experiences, they did not trust the general public, fearing racism, intimidation, and violence. Findings suggest that we need new models of learning and action that recognize cultural contexts, practices, and systemic injustices.

Implications

Across findings, youths' learning about and decision-making related to COVID-19 is deeply tied to how, when, and why they access data and data infrastructures in relation to their lives and communities, as well as how trust mediates these processes. Attention to political and ethical dimensions of learning, and to how tools get leveraged, remixed, and co-opted in the crucial work of critical witnessing and being with, are requirements for advancing justice-oriented work with community partners in remote research.

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Guide to remote methods

In this section, we offer direct comparisons of the methods that researchers at Stanford, the University of Washington, and the University of Michigan innovated in the face of COVID-19 to maintain human connections with their study participants when face-to-face interactions became no longer feasible. In doing so, we hope to (a) highlight the strengths, weaknesses, opportunities, and challenges presented by this select set of approaches, and (b) inspire thinking around how we might add to and improve upon them. By improving the methods for studying learning at home and in communities, we believe we can more faithfully document the experiences of traditionally underserved families and more effectively advocate on their behalf to education leaders, policymakers, funders, and media and technology developers. While other researchers interested in studying learning in restricted environments will find this guide useful, we consider its contents a mere starting point for what we hope will be an ever-growing repository of methodological wisdom and sharing across disciplines and sectors.

The table on page 23 provides side-by-side comparisons of the methods employed by the three studies. The section that follows synthesizes commonalities across them, illustrating the opportunities and challenges associated with conducting remote research using online tools.

TABLE 5: Comparison of remote methods (continues on page 24)

	Stanford	University of Washington	University of Michigan
A. Primary goal/ question	+ How did families support their child's learning and what challenges did they face? + What roles did technology play? + What positive outcomes did parents observe?	+ How did the role of parents evolve? + How are families leveraging and adapting technology? + What technology-supported potential solutions do families envision as addressing their needs during times of crisis and prolonged isolation?	+ How and what science do people learn about COVID-19? + How do people activate and apply the science they learn to make (or revise) personal family decisions? + How is learning about COVID-19 shaped by critical consciousness around racial, educational, and economic justice?
B. Time frame	2 weeks (May-June 2020)	10 weeks (May-August 2020)	1 year (March 2020-April 2021)
C. Recruitment	Inviting existing dscout participant pool to complete screener	Inviting extended network and recruiting through Facebook to complete a screener	Leveraging deep and long-term relationships with participants prior to study
D. Participants	109 parents/caregivers talking about and sometimes including their 5–10-year-old child(ren)	30 families with 3–10-year-old children	60 participants, including adults, young adults (ages 19–24), and children (ages 0–18)
E. Methods overview	*Asynchronous* + Diary studies + Survey measures + Reflective prompts inviting video and image responses + Ratings of learning moments	*Asynchronous* Asynchronous Remote Communities (ARC) incorporating: + Conversation prompts + Diary studies + Interactive drawing activities + Codesign sessions using mixing ideas method *Synchronous* + Interviews	*Synchronous* + Dialogic interviews + Informal conversations *Asynchronous* + Experience sampling
F. Remote data collection tools	+ dscout (mobile app) + Mobile phones	+ Slack + Zoom	+ Telephone + Text + Google Forms + Zoom

TABLE 5: Comparison of remote methods (continued from page 23)

	Stanford	University of Washington	University of Michigan
G. Participant-to-researcher interactions	Researchers commented on participant diary entries and other submissions, resulting in threaded discussions	Researchers engaged in discussions and interactive activities with participants on Slack	Researchers co-analyzed data with participants; co-strategized methods to use with youth/families; engaged in non-research activities such as sewing masks and coordinating supplies
H. Data records	+ Video of participant responses (self-recorded) + Shared artifacts (images) + Survey responses + Threaded discussion transcript + Transcripts of video-entries	+ Video of participant responses (interview) + Shared artifacts (drawings, documentation) + Threaded discussion transcript + Drawings from codesign activities	+ Video and audio of participant responses (interview) + Shared artifacts (links, memes, photos/videos) + Survey responses
I. Analysis	+ Comparative analyses of quantitative data + Summative metrics + Visual and narrative case portraits + Open coding using grounded theory + Iteratively developed codebook	+ Open coding using grounded theory + Iteratively developed codebook	+ Collaborative coding with participants using critical inquiry/grounded theory
J. Approach highlights	+ Geographic diversity of participants + Larger sample to capture breadth of experiences + Mobility of data collection device + Rich data (e.g., video) offers insights into context of homes	+ Smaller sample to capture depth of experiences + Collaborative design + Participant interaction	+ Geographical focus on single communities + Participant-researcher collaboration + Equity considerations with remote methods + Made possible by multiyear research practice partnership

The opportunities and challenges of remote research methods

When schools shuttered in the Spring of 2020, researchers at Stanford, the University of Washington, the University of Michigan, and certainly dozens of other institutions leapt at the opportunity to investigate how the sudden lockdown would alter formal and informal learning as we had come to know it here in the United States. Many were as eager to figure out how to study the evolution of learning at home at a time when it was no longer safe to spend time observing or interviewing learners in person. Others were forced to adjust their data collection protocols to gather data remotely and/or cultivate the trust of strangers whom they would likely never meet face-to-face. These adjustments, at least for the three teams featured in this report, involved quite a bit of ingenuity when it came to adapting

existing research and communication technologies (see Row F of Table 5 above) to get into the field swiftly enough to document family learning as it unfolded within the first few months of the pandemic. Yet, despite the convenience and flexibility of online tools in providing researchers with safe and relatively intimate access to participants, those tools also posed challenges—both novel and familiar—to researchers and participants alike.

Based on conversations from the July 2020 workshop and our analyses of the three case studies, here we present a set of the most salient opportunities and challenges specific to employing online tools for conducting remote qualitative research.

Opportunities

Access to families

+ *Greater reach*. New and greater forms of access to families and their lives was a significant opportunity presented across the studies. In all three, researchers recruited a range of participants, hearing and making sense of critical variations in how people learn, taking into account the ways that learning relates to access, opportunity, preparation, social networks, and ideologies. Remote data collection tools afforded researchers the ability to recruit and include participants across geographies to a greater degree than would be possible using traditional methods constrained by researcher-participant proximity. Within two weeks, the Stanford team used dscout to recruit and engage a geographically-distributed pool of more than 100 parents and other caregivers representing a range of household income levels. The University of Washington team designed and deployed Facebook ads to recruit and organize over 30 families with variety related to race, household composition, home income, and connectivity.

+ *Convenience to families*. All three research teams made use of asynchronous online platforms that allowed participants to contribute when and wherever was most convenient to them. They could upload diary entries, complete online surveys, or respond to email messages before the rush of readying the kids for online school, on the bus, or during downtime at work. Even texts and Slack, platforms that afford near-real-time conversation, made it possible for participants to handle researcher prompts and inquiries at will rather than as interruptions to their otherwise busy days. This gave participants the time and space for deeper reflection on their assignments than if administered in face-to-face interviews, which researchers have always had difficulty scheduling. While asynchronous methods are no replacement for real-time conversations, their convenience may also lessen the likelihood of participant attrition.

Intimacy and connection

Through the use of remote methods, the type of access researchers had to participants also expanded. Researchers reported rich phenomena, using pandemic-safe practices without sacrificing detailed situational data including sights and sounds of the home. While this intimacy also raises ethical challenges to be described below, the data reflecting people's authentic lives-in-the-moment is powerful and contributes to better understanding what families are facing during this time where day-to-day practices have shifted significantly. Despite concerns that the human element of qualitative research might be diminished

when interactions are completely mediated—via Slack, FaceTime, or even phone calls—all three teams reported high levels of rapport with participants. The near-real-time quality of texting and Slack platforms allowed for more frequent, conversational, and casual correspondence between parties, which may have helped establish a level of comfort and trust that periodic in-person visits and even email exchanges common in pre-pandemic studies may not have otherwise afforded.

These communication tools enabled the University of Michigan team, for instance, to engage in ongoing dialogue with key informants, thus allowing them to both chart the direction of their study based on community needs and collaborate on activities as fellow community members—such as sewing masks and distributing supplies—resulting in new relationalities between researchers and participants, such as invitations into homes, new/deeper personal connections, and humanizing conversations. The University of Washington participants expressed appreciation for the reflective and creative aspects of the study, also made possible by the asynchronous nature of the online tools, which gave them the time and space to tackle their assignments without the pressure of researchers peering over their shoulders or keeping time, as real-time visits might impose. In both cases, participants may have felt less like subjects to be studied and more like colleagues with valuable perspectives.

An abundance of data

+ *Multimedia formats*. The ability to collect a large multimedia dataset, including rich qualitative data, in a relatively short amount of time was also considered highly valuable and unique to remote methods. Researchers embraced the multimodal possibilities of remote data collection, accumulating, in all three studies, various data artifacts representing what participants were doing and thinking, including video, images, social media posts, chat dialogue, memes, and links to news stories.

+ *Automated organization*. The automated digitization and transcription features embedded in remote tools minimized researcher hours and maximized data collection and organization. Although data cleaning and manipulation is still required, some of the heavy lifting is done within the remote systems. Chat and discussion threads are archived as participant-identified records of interaction, video is automatically transcribed, data across different entries are merged according to participant, and participant-uploaded artifacts are time-stamped and saved in digital folders.

+ *Living artifacts*. Finally, remote methods afforded participant reflection and commentary on the data as it was collected, thereby creating another source of data. The University of Washington team encouraged participants to combine their own ideas with those shared by other participants, reviewing and building off work, including positive commenting and iterative design versions. The University of Michigan team created timeline representations during the study and asked participants to reflect and interpret, serving as an anchor for further data collection and interpretive refinement. Triangulation of these rich data were used to deepen understanding of learning moments and make connections between participant reflections and what was going on in the world.

Challenges

Logistical dimensions

+ *Dataset size*. The studies that utilized participant-led, asynchronous remote data collection quickly amassed a data corpus larger than what would be possible with traditional family ethnographies or design workshops. While bountiful data is also identified as an opportunity, finding new ways to organize and analyze it quickly and efficiently was something researchers grappled with regularly.

+ *Cost of tools*. While several of the tools researchers used to collect data are free or low cost (e.g., Slack) or are part of university subscriptions that allow researcher access (e.g., Zoom), Stanford used dscout, a more sophisticated but more expensive tool that was specifically designed to conduct remote qualitative research. Cost was a consideration in thinking about not only what was possible for this particular phase of work, but also subsequent new or follow-up studies during the pandemic.

+ *Coordinating times for systematic data collection*. While asynchronous methods allowed for researchers and participants to participate when convenient to them, other factors beyond researchers' control affected scheduling. City, state, and national guidelines related to the pandemic changed from day-to-day, affecting how people lived and worked; additionally, a powerful period of civic unrest related to police violence emerged during the studies. Persisting with data collection schedules and encouraging participation during a stressful time was sometimes tricky without in-person conversations about what was working and how things were going, especially in situations where researchers did not know participants beforehand.

Ethical dimensions

+ *The intimacy associated with views of authentic living spaces*. Although access to participant home environments is not unique to remote methods, data collected without the researcher being physically present blurred the boundary between structured research and something more personal. Some participants recorded their asynchronous video responses at the end of the day right from their bedrooms. For others, their kitchen dishes, dogs, and to-do lists were on full display during interviews. These intimate background portraits have the potential to reveal unanticipated views, including ones that participants are unaware of showing, raising questions about what can and should be recorded. Researchers mitigated this issue to some degree by having participants self-document or by adjusting data collection protocols with participants' input to better shield their privacy.

+ *Questions over data ownership*. A related issue is that of data ownership when researchers are using a third-party system for collection (e.g., Zoom, dscout, and Slack). While researchers could offer clarity to participants over how they would be using and sharing the collected data as sanctioned by their institutional review board (IRB) approvals, they could not make the same reassurances on behalf of the online tool providers.

+ *Navigating new rules*. Researchers also found themselves in the unexpected position of navigating new and complex organizational rules of conducting research during a pandemic as set forth by university IRBs as well as city and state guidelines. Sometimes, as with the University of Washington team, these rules conflicted with their humanistic sensibilities to do what was best for the community under study during times of crises, such as making masks together and participating alongside participants in marches for social justice.

Access and inclusion considerations

Workshop attendees voiced particular concern over access and inclusion-related issues as they pertained to families that couldn't take part in their studies because they lacked access to or weren't regular users of prerequisite technologies. For instance, the Stanford study's sample was drawn from the dscout database, which comprises 100,000+ "scouts" who have signed up to take part in smartphone-administered market research studies, for which they are offered monetary compensation (dscout, 2020). This assumes ownership of a smartphone, some level of tech-savvy, and a reliable Internet connection. As such, while the Stanford study included some families that reported inconsistent or unstable Internet, none were entirely without any Internet connectivity. Similarly, the University of Washington researchers' ARC method focused on participant interactions in online communities such as Facebook, Slack, and Discord; social media nonusers, therefore, did not participate. For the purposes of their small-scale qualitative study, representation of the full range of tech experience wasn't necessary; however, workshop attendees questioned the extent to which online tools may limit "under-connected" families (Rideout & Katz, 2016)—which tend to be overrepresented among lower-income, rural, and immigrant communities in the United States (Rideout & Katz, 2016; Vogels et al., 2020)—from participating in remote research due to lack of access and/or comfort with technology. Workshop attendees also voiced concern for undocumented families, who, understandably, may opt out of studies involving online tools for fear of being tracked or discovered by agencies such as the U.S. Immigration and Naturalization Service. Here again, the online nature of remote research may restrict participation of diverse families who have the most to lose by remaining unseen and unheard.

Building capacity for remote learning: Future research and design priorities

The July 2020 workshop focused on research questions, methods, and early findings from three studies that were conducted a few months into the COVID-19 pandemic. Drawing from the individual case study findings, our analyses of methods across the studies, and conversations from workshop, we present a set of research and design priorities for researchers, policymakers, technology and media producers, and funders to consider as we build capacity for remote learning and research moving into the post-COVID era. Priorities are organized according to the primary goals of building collective understanding across research findings and strengthening capacity for remote research.

Build collective understanding of findings from COVID-19 research on learning and education

In addition to the dozens of education-focused studies funded by NSF's RAPID COVID program, there are likely hundreds of other researchers in the United States and abroad investigating teaching and learning in quarantine. Some are using ethnographic methods, while others are administering surveys or carrying out controlled studies. All, however, are yielding knowledge that may benefit education practice, policy, technology design, and subsequent research, and this collective knowledge would surely be more impactful than the sum of its parts. Yet, as is too often the case in the scholarly world, this global community remains disconnected. Unfortunately, there is too much at stake for learners today to allow researchers to carry on in their silos, and so we propose the following suggestions for cultivating collaboration across methodological, disciplinary, and sectoral boundaries.

+ *Locate, build, and strengthen networks across the global scientific community*. While COVID-19 has in some ways improved scholarly sharing—webinars abound and in-person annual conferences have been replaced by online formats that make attendance more feasible from afar—a fundamental question still exists: How do we locate others doing similar research? Fortunately, there are resources like the COVID Information Commons (CIC), which provides a database of all COVID-related studies funded by the National Science Foundation (NSF #2028999), but searches are limited to work being conducted in the United States. More can be done to improve international sharing, communication, and collaboration around both our findings and methods of investigation. If the three cases studies featured in this report have taught us anything, it's that online tools can, in fact, support meaningful and sustained relationships between researchers and participants. How might we use some of the lessons learned through our examination of remote methods to cultivate a more connected global scientific community?

+ *Synthesize findings across COVID-19 studies*. More synthetic work is needed to integrate findings from studies that were independently conceived but that contribute to our understanding of what happened during the early phases of remote learning. These syntheses are particularly important now, as they may help practitioners improve the design of formal and informal learning systems and suggest avenues for future research.

+ *Conceptualize equity-focused research and design agendas*. Pandemic disruptions have led to a set of interdependent and multidimensional challenges to equitable access to learning opportunities. Research efforts toward the start of school shutdowns aimed to ensure that families' immediate needs were addressed and to identify critical gaps in learning opportunities. Educational leaders have since noted that the dramatic shifts in learning routines, practices, and resources surfaced through this early-stage research have made it possible to reimagine educational systems (Darling-Hammond et al., 2020). To create a transformative research and design agenda, justice-oriented frameworks that address the political and social dimensions of racial and economic inequality are needed, along with associated conceptual work to define features of resilient educational systems and the conditions that support them. Research-practice partnerships that include families, communities, schools, and informal learning institutions will be essential for tailoring research and design efforts to address highly localized challenges facing communities.

Strengthen the field's capacity for rapid, collaborative, and useful remote research

The Stanford, University of Michigan, and University of Washington teams drew on existing technologies and adapted their usual research practices to design the remote studies. During the workshop, attendees had several ideas for additional methods, tools, and norms that could better support participants and researchers alike, highlighting the need for shared norms and guidelines informed by collective stakeholders.

+ *Innovate methods and prioritize funding for studies that promote inclusion.* Preexisting research panels, social media networks, and other off-the-shelf solutions made it convenient and cost effective for PIs in this report to hit the ground running—especially within the constraints of the NSF's RAPID funding program—but these choices excluded certain families. It is critical to develop research approaches that include all families. Researchers need sufficient budgets to provide under-connected families with the tools needed to study them—namely, hardware (e.g., laptops), broadband (e.g., mobile hotspots), and requisite training. We also need to think out-of-the-box to design data collection tools and protocols that are, in fact, less reliant on technologies and practices not part of the everyday lives and realities of vulnerable families. These tools and protocols must also be developed with consideration for the needs and wishes of immigrant families regarding surveillance. Researchers must be absolutely transparent about who will have access to families' data if they hope to assuage any fears or uncertainty that would prohibit certain families from participating.

+ *Develop research-practice partnerships with families at the center.* Long-term, mutually beneficial collaborations between researchers and practitioners researching authentic problems are successful in producing actionable findings (Coburn & Penuel, 2016). But such partnerships rarely include families and parents as full collaborative partners. The need to recognize families as design and research partners in child learning is not new, but it is even more critical during school closures. Workshop participants expressed particular interest in creating shared representations during the data collection process, such as event timelines or storylines that participants and researchers can see and build on together. Additionally, involving families, practitioners, and qualitative researchers with industry partners in discussions of what remote learning tools can and should look like has potential for informing rich, collaborative design and research work that integrates different interpretations of what is needed, what is valued, and what is possible.

+ *Establish new approaches and best practices for ethical and robust remote research methods.* Technology-enabled qualitative research is, as we have discovered, complicated, and especially so when studying vulnerable populations. It requires the help and perspectives of other researchers, families, and social support organizations to identify the most pertinent pain points and weigh in on potential solutions. The July workshop on remote methods elicited such feedback, including suggestions to:
  – Train researchers on human-centered research methods (e.g., trauma-informed approaches) and consult participants on research and design decisions;
  – Establish new and/or expanded ethical norms around data collection confidentiality and privacy; and
  – Encourage purposeful collaboration between designers and researchers to design tools that meet both industry and academic standards in terms of cost, flexibility, data privacy, and ownership.

+ *Reconcile the relationship between responsiveness and rigor.* "Rigor" is a commitment to methodological procedure valued in both qualitative and quantitative research (Gill & R Gill, 2020), and commonly pitted as the opposite of flexibility. But if the ultimate purpose of the scientific process is to improve the human condition, then researcher responsiveness to human needs—whether those needs arise from global, local, and/or personal circumstances—must be valued right alongside rigor. While qualitative research is more typically critiqued for sacrificing rigor for responsiveness, the pandemic has also pushed quantitative researchers to negotiate these tradeoffs. For instance, pharmaceutical researchers have departed from established methodological norms around COVID-19 vaccine clinical trials to get products to market sooner with the hope of saving more lives (Mukherjee, 2020). We argue that there is space for rigor and flexibility to coexist within high-quality research, and we encourage the broader scientific community to collectively redefine their coexistence in terms that no longer employ words like "sacrifice" and "tradeoff."

Closing thoughts

In this report, we have shared three studies that foreground the experiences of families traditionally underserved by U.S. education systems: families whose children have suffered most from the pandemic-related school closures and that most urgently need our attention. Even in this advanced technological age, millions of students have essentially lost a year of school due to a lack of access to tools that should, by now, be universal—a right, not a privilege.

As the coronavirus and its extended effects continue to throw curveballs—such as school re-openings followed by re-closures, the tragic string of events leading to the Black Lives Matter protests and, perhaps most commonly, the day-to-day pressures of living in these economically challenging, socially distanced, and life-threatening times—it is critical that the global research community do better at capitalizing on what has been learned and coordinating diverse networks to determine design and research agendas. Institutes of higher education, government agencies, industry, and philanthropic organizations must continue to support this work by funding high priority research, organizing and hosting meetings, building networks and tools and, finally, investing in robust broadband, hardware, and training systems.

The NSF-funded remote methods workshop occurred early in the summer of 2020, just months after the coronavirus was declared a pandemic. We have learned much since then as a field, and we hope that the recommendations in this report are useful in inspiring next steps toward preparing for a more equitable educational future for all families.

Appendix

More about the Stanford study

Over 1,000 scouts applied to the study from dscout's participant pool, who are roughly representative of the U.S. cellphone owning population. For parents that fit our criteria (at least one 5–10-year-old child whose school building closed due to COVID-19), we assigned household income levels ($0-49K, $50-99K, over $100K) and randomly selected 37 from various income groups for a total of 111 participants; 109 completed the study. Our sample was majority female (76%) with some diversity of race/ethnicity (55% White, 16% Black, 15% Latinx, 9% Asian, and 4% Middle Eastern/North African) and level of education (32% were high school graduates while 29% reported post-graduate work beyond college).

Data collection was organized in five parts that participants completed over the course of two weeks as outlined in Table 6. Each part included multiple-choice survey items, open-ended text responses, image uploads, and video prompts. Questions were directed to parents and other home caregivers such as grandparents or live-in partners.

We used a variety of analytical methods to explore the data, including descriptive quantitative summaries and construction of indices reflecting breadth of challenges, diversity and source of resources, and perceived learning outcomes; coding open-ended text responses and video transcripts across cases to capture variation in themes using grounded theory and deductive approaches; developing case portraits to help theorize parent-identified examples of learning collected in the diary entries.

TABLE 6: Mission components and data collected

Study component	Topics covered
Application	Demographics; school status during pandemic; challenges with remote learning
Part 1	Pre-pandemic home and school academic access and support
Part 2	During-pandemic learning resources provided by schools; how parents were supplementing and supporting learning
Part 3	Photo and verbal description of a learning moment; identification of activity origin and content; ratings of enjoyment and learning (this part required 6 unique entries, one per day)
Part 4	How families were learning about COVID-19; examples of questions children were asking and of a conversation they had with their child
Part 5	Reflection on possible benefits of remote learning and insights about what and how their child learned; evaluation of how well their child kept up with learning, interests, and social-emotional wellbeing as well as their own capacity to adapt to remote learning

TABLE 7: Analytic foci for open-ended responses and diary entries

Focus domains	Categories
Learning moments documented in diary entries	Types of learning activities; caregiver learning partner practices; caregivers' purposes for the creation or extension of learning activities; powerful practices/ creative innovations; forms of digital, analog, and tangible resources leveraged; parent and child affect; child-initiated learning activities
Challenges related to learning	Child engagement and understanding; family coordination; parent roles as guides and teacher; parent and child social and emotional wellbeing; teacher/school support; technological troubles
School supports for learning	Parents' needs; perceptions of valuable resources; desires for more support
Benefits	Sources of parent insights about learning; family bonding; closer parent-teacher relationships; new skills
Hopes	Hopes for child's academic learning and social wellbeing; family relationship; value systems
Learning about COVID-19	Resources for learning; children's questions; conversational content; STEM topics explored; parents' roles

More about the University of Washington study

TABLE 8: University of Washington study participant demographics (continues on page 36)

Group	Participant ID	Race/ethnicity in household	Children ages in household	Household income
A	P1_A	African American, Asian	3, 10	< $10k
	P2_A	White	9	$50-100k
	P3_A	Asian-Pacific Islander	2, 13, 17	> $150k
	P4_A	White, Latino	3, 6	$50-100k
	P5_A	African American	9, 9	> $150k
	P6_A	White	4, 10	> $150k
	P7_A	White, Asian-Pacific Islander	7	$100-150k
	P8_A	White Hispanic, Asian Pacific Islander	8, 5	$50k-$100k
	P9_A	White, African American	10	$50-100K
	P10_A	White	2, 4, 6, 8, 9	N/A
	P11_A	White, Latino	<1, 2, 5, 9	$10k-$50k
	P32_A	White	3.5, 12	Laid off

TABLE 8: University of Washington study participant demographics (continued from page 35)

Group	Participant ID	Race/ethnicity in household	Children ages in household	Household income
B	P12_B	White	9	$50k-$100k
	P13_B	Hispanic or Latino, White	N/A	$50k-$100k
	P14_B	White, Asian / Pacific Islander	10, 12	$50k-$100k
	P15_B	White, Black or African American	N/A	$50k-$100k
	P16_B	White	11, 7	$10k-$50k
	P17_B	Black or African American	12, 16	$50k-$100k
	P18_B	White	11	$10k-$50k
	P19_B	Sri-Lankan and Italian	N/A	$100k-$150k
	P31_B	White, Middle Eastern	6	$100k-$150k
C	P20_C	White	3, 4	$10k-$50k
	P21_C	White	2, 3, 6, 9, 12	$10k-$50k
	P22_C	White	4	$10k-$50k
	P23_C	Black or African American	3	$50k-$100k
	P24_C	White	3, 9, 11	$10k-$50k
	P25_C	White	1, 4, 6	$10k-$50k
	P26_C	White	13, 16, 18	$10k-$50k
	P27_C	Arab	5	$50k-$100k
	P28_C	White	7, 8, 10	< $10k
	P29_C	White, Asian / Pacific Islander	3	$50k-$100k
	P30_C	White	11	$10k-$50k

TABLE 9: University of Michigan study participants and contexts

Great Lakes Community Center	Great Lakes City public schools	West Coast City Design Center	West Coast City Public Schools
14 adults (parents/guardians of youth, school and community educators, district leaders or community-based organization providers)		6 adults (parents/guardians of youth, school and community educators, district leaders or CBO providers)	
14 youths across Boys and Girls Club, Lansing and public schools (12-18)		6 youths across WCCDC and public schools (12-18)	
5 young adults (ages 19–29)		17 young adults (ages 19–29)	

TABLE 8: University of Washington study participant demographics (continues on page 36)

Focus domains	Categories and examples
What information is accessed	Form: Narratives, graphics, simulations, scientific explanations, images, etc. Focus: Evaluating information: How participants decide what is trustworthy and why. How this decision relates to racialized, politicized, and ethical stances.
How/Where/Who information is accessed	Social media, news, family members, school/district communication, etc. How these forms of information are accessed through social networks.
When information is accessed	Early/mid/late in pandemic timeline.
Why information is accessed & how contextualized	Knowledge-building/interest, personal decision-making, health decision-making, action-taking, etc. How knowledge-building, etc. relates to/is complicated by racialized, politicized, and ethical stances.
Analysis	How information is combined and evaluated across political, ethical, scientific, and public health sources.
Conclusions and implications	Decisions that are made, revisited, or revised.
Events that stand out and why	Personal stories about oneself and loved ones who contract COVID-19, news events related to federal recommendations, reactions to anti-quarantine protests, etc.

References

Aguilar, S. J., Galperin, H., Baek, C., & Gonzalez, E. (2020). *When school comes home: How low-income families are adapting to distance learning* [Preprint]. EdArXiv. https://doi.org/10.35542/osf.io/su8wk

Barron, B., Martin, C. K., Lin, V., Lam, C., Pozos, R., Nguyen, J., Garcia, S., & Levy, Z. (2021). *New views, new roles: How parents supported learning during the transition to remote learning*. Annual Meeting of the International Society of the Learning Sciences (ISLS), Bochum, Germany.

Barron, B., Martin, C. K., Takeuchi, L., & Fithian, R. (2009). Parents as learning partners in the development of technological fluency. *International Journal of Learning and Media, 2*(1), 55–77.

Bhattacharya, A., Liang, C., Zeng, E. Y., Shukla, K., Wong, M. E., Munson, S. A., & Kientz, J. A. (2019). Engaging teenagers in asynchronous online groups to design for stress management. *Proceedings of the 18th ACM International Conference on Interaction Design and Children*, 26–37.

Calabrese Barton, A., Greenberg, D., Turner, C., Riter, D., Perez, M., Tasker, T., Jones, D., Herrenkohl, L. R., & Davis, E. (2021). Youth and family data activism in the 2020 multi-pandemic. *AERA Open*.

Charmaz, K. (2017). The power of constructivist grounded theory for critical inquiry. *Qualitative Inquiry, 23*(1), 34–45.

Coburn, C. E., & Penuel, W. R. (2016). Research–practice partnerships in education: Outcomes, dynamics, and open questions. *Educational Researcher, 45*(1), 48–54.

Darling-Hammond, L., Schachner, A., & Edgerton, A. K. (2020). *Restarting and reinventing school: Learning in the time of COVID and beyond* (p. 126). Learning Policy Institute.

Erete, S., Dickinson, J., Martin, C., Bethune, A., & Pinkard, N. (2020). Community conversations: A model for community-driven design of learning ecosystems with geospatial technologies. In M. Gresalfi & I. S. Horn (Eds.), *The Interdisciplinarity of the Learning Sciences, 14th International Conference of the Learning Sciences (ICLS* (Vol. 3, pp. 1629–1632). International Society of the Learning Sciences.

Gill, G., & R Gill, T. (2020). What is Research Rigor? Lessons for a Transdiscipline. *Informing Science: The International Journal of an Emerging Transdiscipline, 23*, 047–076. https://doi.org/10.28945/4528

Greenberg, D., Calabrese Barton, A., Turner, C., Hardy, K., Roper, A., Williams, C., & Tasker, T. (2020). Community infrastructuring as necessary ingenuity in the COVID-19 pandemic. *Educational Researcher, 49*(7), 518–523.

Gutiérrez, K., Higgs, J., Lizárraga, J., & Rivero, E. (2019). Learning as movement in social design-based experiments. *Human Development, 62*(1–2), 66–82.

Herrenkohl, L. R., Tasker, T. Q., Davis, E., Jones, D., Para Camacho, F., Siciliano, P., Nkwuzor, P., Ali, M., Wang, E., Calabrese Barton, A., Greenberg, D., Turner, C., & Riter, D. (in preparation). *Trust as epistemic and cultural mediator during the 2020 multi-pandemic*.

Jurow, A. S., & Shea, M. (2015). Learning in equity-oriented scale-making projects. *Journal of the Learning Sciences, 24*(2), 286–307.

Kuhfeld, M., Soland, J., Tarasawa, B., Johnson, A., Ruzek, E., & Liu, J. (2020). Projecting the potential impacts of COVID-19 school closures on academic achievement. *Educational Researcher, 49*(8). https://doi.org/10.3102/0013189X20965918

Lee, C. D. (2010). Soaring above the clouds, delving the ocean's depths: Understanding the ecologies of human learning and the challenge for education science. *Educational Researcher, 39*(9), 643–655.

MacLeod, H., Jelen, B., Prabhakar, A., Oehlberg, L., Siek, K. A., & Connelly, K. (2016). Asynchronous remote communities (ARC) for researching distributed populations. *PervasiveHealth*, 1–8.

Milan, S. (2019). Acting on data (fication). Citizen media and practice: *Currents, connections, challenges*.

Mukherjee, S. (2020, June 9). Can a Vaccine for Covid-19 Be Developed in Record Time? *The New York Times*. https://www.nytimes.com/interactive/2020/06/09/magazine/covid-vaccine.html

National Science Foundation. (2020, March 3). Dear Colleague Letter on the Coronavirus Disease 2019 (COVID-19). *National Science Foundation*. https://nsf.gov/pubs/2020/nsf20052/nsf20052.jsp?org=NSF

National Science Foundation. (2021). *COVID-19 response funding update*. https://www.nsf.gov/about/congress/funding%20updates/CFRU%206.19%20to%206.25.pdf

Nguyen, J., Barron, B., Martin, C. K., Lam, C., Pozos, R., Lin, V., Levy, Z., & Garcia, S. (2021). F*amily resilience during Covid-19: Contrasting cases of mothers' beliefs and behaviors to support child well-being*. Annual Meeting of the International Society of the Learning Sciences (ISLS), Bochum, Germany.

NORC. (2020). *Combatting pandemic learning loss: Providing data-driven insights to reduce COVID's impact on STEM learning*. NORC.Org. https://www.norc.org/Research/Projects/Pages/combatting-pandemic-learning-loss-providing-data-driven-insights-to-reduce-covid's-impact-on-stem-learning.aspx

ParentsTogether. (2020, May 27). ParentsTogether survey reveals remote learning is failing our most vulnerable students. *ParentsTogether Action*. https://parentstogetheraction.org/2020/05/27/parentstogether-survey-reveals-remote-learning-is-failing-our-most-vulnerable-students-2/

Pew Research Center. (2020). *53% of Americans say the Internet has been essential during the COVID-19 outbreak*. Pew Research Center.

Polikoff, M., Saavedra, A. R., & Korn, S. (2020, May 8). Not all kids have computers – and they're being left behind with schools closed by the coronavirus. *USC Dornsife Center for Economic and Social Research*. http://dornsifelive.usc.edu/news/stories/3213/not-all-kids-have-computers-and-theyre-being-left-behind-with-sc/

Pozos, R., Martin, C. K., Barron, B., Lam, C., Nguyen, J., Lin, V., Levy, Z., & Garcia, S. (2021). *Before the storm: How families were supported for the transition to distance learning*. Annual Meeting of the International Society of the Learning Sciences (ISLS), Bochum, Germany.

Rideout, V., & Katz, V. S. (2016). *Opportunity for All? Technology and Learning in Lower-Income Families*. Joan Ganz Cooney Center at Sesame Workshop.

Strauss, A., & Corbin, J. M. (1997). *Grounded theory in practice*. Sage.

The Education Trust-West. (2020). *Educational equity in crisis: Listening to parents: The results of our statewide survey of public school parents*. https://edtrustmain.s3.us-east-2.amazonaws.com/wp-content/uploads/sites/3/2017/11/24113810/ETW-K12-Parent-Poll-March-2020.pdf

University of Oregon CTN. (2020, September 8). *Something's gotta give*. Medium. https://medium.com/rapid-ec-project/somethings-gotta-give-6766c5a88d18

Villenas, S. (2019). Pedagogies of being with: Witnessing, testimonio, and critical love in everyday social movement. *International Journal of Qualitative Studies in Education, 32*(2), 151–166.

Vogels, E., Perrin, A., Rainie, L., & Anderson, M. (2020). *53% of Americans say the Internet has been essential during the COVID-19 outbreak*. Pew Research Center.

Wang, X. (2020, July 22). *New education data from the household pulse survey*. https://nces.ed.gov/blogs/nces/post/new-education-data-from-the-household-

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The Joan Ganz Cooney Center at Sesame Workshop is a nonprofit research and innovation lab that focuses on the challenges of fostering smarter, stronger, and kinder children in a rapidly changing media landscape. We conduct original research on emerging learning technologies and collaborate with educators and media producers to put this research into action. We also aim to inform the national conversation on media and education by working with policymakers and investors.

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