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Abstract

The COVID-19 pandemic ushered in a dramatic shift to online learning for K-12 public schools, requiring school districts to address inequities that surfaced in the remote learning model. This paper includes the findings of the second study of a multi-year research project exploring the intersection of technology and educational inequities through the pandemic. As the pandemic waned, practitioners evaluated which practices developed during remote learning should be sustained. Five Minnesota technology directors participated in a focus group to discuss how inequities are being addressed in their schools post-pandemic. Technology directors explained that the pandemic was an opportunity to reimagine schools for the success of all students through an infrastructure that includes actions relative to three domains: effective instruction, school-home partnerships, and law and policy. Further research is recommended, such as broadening the geographical location of participants outside of Minnesota, expanding participants beyond the role of technology director (i.e., students, teachers, parents), and analyzing student enrollment in K-12 online schools through a longitudinal study.

Keywords: technology sustainability, equity literacy framework

Introduction

The advent of remote learning due to the COVID-19 global pandemic required school systems to quickly and significantly change how they served students (IES, 2021-2023). The impact of transitioning to a remote learning model was disproportionately burdensome for students and families from underrepresented populations (Hill & Reimer, 2022). The technology divide gained prominence, and schools were forced to address the divide in a timely, effective manner. Schools functioned in survival mode throughout the pandemic, and there was limited time for reflection, monitoring effectiveness, or investing in continuous improvement.

Due to the pandemic, school learning models vacillated between remote, HyFlex, and in-person for multiple years.. As school communities, some of the learnings and practices aimed to better address inequities during the pandemic were sustained. Yet, decisions regarding which practices to keep and which to discard were made at the local level with limited cross-school or cross-district communication to capitalize on successful practices.

COVID-19 and K-12 Education

The COVID-19 pandemic changed the landscape of education. The pandemic closed schools for 168 million children around the world for a year, from March 2020 to February 2021 (UNICEF, 2021). The United States followed a similar trajectory in spring of 2020 (Baker, 2022), relying heavily upon "teleschool" or remote learning options to conclude the school year. By September 2021, 98% of all U.S. public schools were recovering and again offering in-person instruction (IES, 2021-2023).

While some continued to grapple with the long-term effects of the coronavirus, by 2023 there were signs that the pandemic was coming to a conclusion. In the United States, the Executive Office of the President announced the end of the COVID-19 National Public Health Emergency in early May; also in 2023, the Center for Disease Control and Prevention (CDC) reported that the spike in the number of cases of those over 65 years of age needing hospitalization due to the COVID-19 virus decreased following its spike in December 2022. The official statements eased public concern and lifted public systems' restrictions, specifically for K-12 education.

The Institute of Educational Sciences conducted the *School Pulse Study* over two academic years (2021-2022 and 2022-2023) to track the impact of COVID-19 on K-12 schools across the nation. According to their 2023 data, conceivably all brick-and-mortar public schools in the United States are again offering in-person instruction; however 14% of students were still choosing a hybrid learning mode, and an average of 4% of students were opting

for fully remote instruction. The *School Pulse Study* collected data on technology access and, as of August 2022, "94% [of districts] were offering devices to those who needed it," and "45% were offering internet access." Even though the pandemic may be easing, the need to address education inequities remains. To address these challenges, schools need to call upon one essential member of their staff: the district technology director.

Critical Role of the Technology Director

The role of the school district technology director is multi-faceted. Directors are often in charge of purchasing and implementing both hardware and software for district-wide use and overseeing training on new and existing technologies, all while supervising a department of professionals trained to assist in this process (STMA, 2023). The role can include managing individual student devices, overseeing the district's internet network, and monitoring essential software, such as student information systems (Stultz, 2022). Many directors hold an administrative license, although a bachelor's degree, teaching experience, and knowledge of technology are common requirements for the position.

During the onset of remote learning due to the COVID-19 pandemic, technology directors reported that their jobs were "transformed overnight," (Kareem Nittle, 2021), shifting from district wide, day-to-day operations supporting in-person instruction to reinventing education to accommodate mass online learning. Not only was this a tactical challenge, but it proved to be an equitable challenge as well. Dr. Corinne Hyde, an associate (teaching) professor of clinical education at USC Rossier was interviewed by Kareem Nittle (2021) who summarized the situation:

> A big challenge for people who are trying to manage technology for a district or a school site is that they're now having to take into account the varying resources and situations in students' homes. You're now dealing with a lot of inequity, potentially, in terms of whether students even have high-speed internet access to be able to use these devices in their own spaces (para. 5).

Purpose of the Study

The purpose of this study was to explore the technology-related practices that schools implemented to address the digital divide and other inequities illuminated during the pandemic, and identify which technology-related practices have been sustained as schools transition to the endemic phase of COVID-19. This study probed how technology structures can be utilized to provide equitable access to an effective education in the online environment within the classroom (AASA, CoSN, NSBA, as cited in Office of Educational Technology, 2017). Researchers utilized the equity literacy framework (Gorski, 2018) as a lens to theorize the study. Findings highlight effective practices school districts may consider implementing to address inequities and better meet the needs of all students in their communities.

Equity Literacy Framework

Equity literacy is a comprehensive framework for creating and sustaining equitable schools (Equity Literacy Institute, 2021). The framework encompasses bias, inequity, and oppression related to race, language, immigration status, religion, class, gender identity and expression, sexual orientation, and (dis)ability. Equity literacy diverges from other diversity approaches in its insistence on "maximizing the integrity of transformative equity practice" (Gorski, 2021). Equity literacy is founded on a commitment to deepening understanding of how equity and inequity operate in organizations and societies, developing knowledge and skills, and identifying inequities, eliminating inequities, and actively cultivating equity (Reimer & Hill, 2022).

The equity literacy framework asserts that educational outcome disparities are not the result of deficiencies in marginalized populations but rather inequities in the system (Thomas, 2018). Equity literate educators commit to an ideology that revokes deficit narratives and instead invites stakeholders to view equity through a structural lens. Structural ideology contends that traditional schooling, from early childhood to grade 12, was established and functions in a way that only some groups of people will experience success and prosperity, as evidenced in disproportioned access to experienced teachers, honors or advanced curriculum, engagement with authentic learning, arts education, and co-curricular programs (Dudley-Marling, 2015). Families experiencing oppression often have less access to internet technology, books, tutoring, and other resources that support school achievement (Lineburg & Ratliff, 2015). Regardless of the amount of effort members of other groups exert, they may continue to experience diminished outcomes. Educators with a structural ideology understand that education-

related gaps are the result of structural barriers in and out of school rather than moral deficiencies or grit shortages in students and families who have been historically marginalized (Gorski, 2018).

The equity literacy framework contends that as long as structural barriers exist, education outcome disparities will exist (Berliner, 2013). Educators must position themselves to become a threat to the existence of structural inequities in schools and districts, which will require a disruption to past traditions, values, and beliefs as educators seek new solutions and practices.

Integration of Framework and Study

The COVID-19 pandemic upended traditional education structures as schools quickly transitioned to remote learning models, which contextualized the research study's unprecedented alignment with the equity literacy framework's structural approach. The education system was in emergency response mode, and a deficit approach would have resulted in barriers that slowed progress and would have become points of disdain for polarized communities. At the same time, inequities hidden in brick and mortar buildings became increasingly visible. Access to education was a shared need, and underserved populations were quickly identified. These populations include non-majority racial/ethnic groups, students and families experiencing poverty, students qualifying for special education services, and individuals with mental health concerns. These populations were specifically included in the focus group protocol questions. Finally, as school districts returned to in-person learning models, structural changes that improved systems and better served students were sustained. Identifying, documenting, and dispersing these practices for wide-spread implementation was the ultimate purpose of the study.

<center>**Research Questions**</center>

RQ1. How have schools leveraged technology to address inequities during the pandemic?

RQ2. What technology-related practices, initiated during the pandemic to better serve underrepresented populations, have been sustained post-pandemic?

<center>**Literature Review**</center>

Technology Equity: Beyond Providing Devices

Numerous papers published both pre-pandemic and beyond called for a closing of the digital divide, in part, by providing personal technology devices and home internet access to all students (Evans & Annan, 2018; Hall et al., 2020; Tinubu & Herrera, 2020; Male & Burden, 2014). Providing devices is part of the solution for solving the equity equation, but there are more variables to consider. As described in the *National Education*

Technology Plan, one of these variables is building a solid school infrastructure while developing and administering equitable policies related to technology. Schools with a strong infrastructure have a strong internet connection within the school and provide access to students who need it outside the walls of the classroom. Their devices contain the software necessary to be able to collaborate with others from various locations. Teachers are well trained to deliver high quality education, and the administration supports this process through equitable policies. This means that student privacy is protected, expectations are communicated, inequalities and financial burdens are addressed, and devices are well managed (Office of Educational Technology, 2017).

Another variable in solving the inequity equation is ensuring students not only know how to use their devices in the technical sense, but ensuring they also understand how they can leverage the technology to increase their learning. Students need to possess the knowledge and skills to utilize technology within the context of each individual content area (Fennelly-Atkinson, 2023). This also means that schools need to learn how to differentiate instruction to meet the needs of all learners in the online environment, including those with disabilities, those who speak multiple languages, and those who come from various cultures (Digital Promise, 2023).

Mental Health Related Inequities During the Pandemic

Maintaining mental health as a child or adolescent during the pandemic was challenging for many reasons, including the fact that young people often had underdeveloped coping skills, experienced isolation from peers, and encountered increased screen time within their days of remote learning (Imran, et. al., 2020). Meherali et al. (2021) revealed that pandemics and their isolating mitigation measures can cause stress and anxiety for those under 18 and can ultimately lead to unhealthy behavior patterns. Increased screen time can lead to low-self esteem and addictive behaviors (Thakur et al., 2020). Children and teenagers reported having an overall lower quality of life and an increase in physical symptoms such as headaches, irritability and "feeling low" (Ravens-Sieberer, et al., 2020). Adegboye et al. (2021) found that when parents experienced financial stress, the mental health of their children was impacted.

The pandemic elicited increased feelings of helplessness and suicidal attempts, particularly for girls. The CDC issued a 10-year (2011-2021) survey report on *Youth Risk Behavior* and found that 60% of females reported feeling "sad or hopeless" in 2021, and over 30% of girls reported attempting suicide. Further complicating this matter, a recent survey of school superintendents found that the majority of school leaders felt they lacked the

human resources to address the mental health issues of their students, even though they acknowledge the increased needs post-pandemic (EAB, 2023).

Ability Related Inequities During the Pandemic

It is estimated that 14 million K-12 students in the United States identify as having a disability (Morando-Rhim & Ekin, 2021). The education of these students was interrupted during the pandemic, excluding them from access not only to learning but also to other essential services such as occupational therapy, physical therapy, and special education services (Chen, 2022). Depending upon parents' transportation capacity, these students also lost access to school-based nutrition as well as other regularly provided school-based health services (Dooley et al., 2020). During remote learning, higher absenteeism was reported for this demographic, school districts struggled to meet the requirements outlined within Individualized Education Plans (IEPs), and many students experienced learning loss, particularly in the area of social skills (Morando-Rhim & Ekin, 2021).

Equitable access to technology within the home proved challenging for some students with disabilities. For example, those with sensory disabilities may have encountered barriers to online learning with video content, especially if captions were unavailable (Parida & Sinha, 2021). Parents were not trained in the use of technology or specialized education techniques when assisting their children (Morando-Rhim, & Ekin, 2021), a consequence of districts' time limitations and human resource exhaustion. . One study found that remote learning had a negative association for special education teachers; they felt less connected to and supported by their colleagues, and felt less able to succeed in their work (Womack & Monteiro, 2022). However, depending on the nature of their students' disability, some reported positive learning experiences for students receiving special education services during the pandemic, including higher levels of attendance at IEP meetings via video conferencing technology, and learning gains in the online learning environment (Morando-Rhim & Ekin, 2021).

Socioeconomic Status (SES) Related Inequities During the Pandemic

While the COVID-19 pandemic undoubtedly impacted all K–12 students, the effects were more severe for students and families experiencing poverty. As schools rapidly transitioned to remote learning models, low-income families were less likely to have access to the technology required to participate in online learning (Stelitano et al., 2020). In the spring of 2020, 40% of low-income parents reported that their children accessed public Wi-Fi to complete schoolwork due to unstable or no internet connections at home, compared to 6% of upper-income parents

reporting the same issue in their homes (Vogels et al., 2020). This became of great concern during the pandemic as public buildings were closed, and almost half of low-income families struggled to secure internet access.

Parents in low-income households were more likely to be essential workers, with less time to devote to online learning (Berube & Bateman, 2020). Compounding the inequity, students whose parents could hire a tutor were more likely to compensate for potential learning loss due to pivoting learning models. Internet searches for educational resources spiked following the COVID-19 pandemic, but the increase was greater in higher-income areas, further documenting differences in learning opportunities by income (Bacher-Hicks et al., 2020). Within the home, low-income families were challenged to secure consistently available space for their children to complete school work (Aguilar et al., 2020).

In low-income communities, schools serve as the hub for supports such as meals, mental health counseling, and childcare. Feeding America (2021) reported that one in four children was at risk of hunger during the pandemic. With an increase in parental job loss, the number of children who were housing insecure rose as families struggled to pay rent (Keith-Jennings et al., 2021). As students struggled with having their basic needs met, they had less capacity to prioritize learning.

Racial and Ethnic Related Inequities During the Pandemic

The pandemic set back learning for all students, but learning loss was especially prevalent for students of color. In the spring of 2020, districts made a Herculean effort to provide students with the tools and resources to thrive academically in a remote environment. Despite the distribution of devices, efforts to connect students to the internet, initiatives to reconnect with homeless students, and implementation of regulations on remote instruction, gaps remained. Black and Hispanic households were 3-4% less likely than White households to have reliable access to devices, and Black/Hispanic households were 10% less likely to have reliable access to the internet (von Zastrow, 2020).

Beyond technical access, disparities existed in the quality of remote learning models. While in remote learning, most experts agreed that synchronous, direct instruction benefited students' academic progress (Gray & DiLoreta, 2016). Black and Hispanic students were twice as likely as White students to have received no live contact with teachers over the previous week and were 3-6% less likely to have received consistent live instruction (Dorn, et. al, 2020). This inequity may have been a byproduct of under-resourced schools. During this same time period, predominantly White districts benefited from $23 billion more than their non-White counterparts serving

similar numbers of students (Sosina & Weathers, 2019). The discrepancy was due to racial segregation within educational systems, property taxes as the primary source of school funding, and White districts tended to be wealthier than those of color.

Inequitable learning opportunities continued as schools returned to in-person learning. Though parents reported in-person students had access to higher quality learning experiences (Rapaport et al., 2020), there were stark differences in school modality by demographics that persisted through the 2020-2021 school year. Black, Hispanic, and Asian students were less likely to attend in-person schooling relative to White students, while elementary and rural students were more likely to be in person (Camp & Zamarro, 2021). Urban areas extended remote learning, and even within the same large district, Black and Hispanic students were more likely than White students to extend remote learning as the preferred modality (Dorn, et. al, 2020). The sum of these disparities resulted in an expansion of the achievement gap that existed prior to the pandemic.

Methodology

This research was steeped in the equity literacy framework's principles of identifying inequities and addressing inequities via a structural approach. The study utilized a case study research design (Hancock et al., 2021): an intensive analysis and description of school systems' use of technology to address inequities during the COVID-19 pandemic and into the endemic. Through the case study design, researchers gained in-depth understanding of structural changes schools implemented to better serve underrepresented populations. Insights gleaned from the study can directly influence school district practices, educational policy, and future research (Yin, 2018). This study encompasses the second study of a multi-year research project exploring the intersection of technology and educational inequities through the COVID-19 pandemic.

The first study, conducted in 2021, consisted of distributing a mixed methods survey via email to Minnesota district technology directors to collect data to identify their school district's greatest concerns regarding the digital divide, via Likert scales, and to learn how districts addressed inequities, via open-ended questions (Hill & Reimer 2022). Participants were invited using the names and e-mail addresses made available through the Minnesota Department of Education website. The website provided public access to an Excel spreadsheet listing 572 Minnesota district technology coordinators and their contact information. Surveys were completed by 56 participants, and descriptive statistics provided a glimpse into participants' priority concerns and efforts aimed to

address the concerns. Longitudinally, there was a need to gain deeper insights and understandings of how the digital divide was addressed as well as the long-term implications.

This follow-up qualitative study recruited participants in the same way as the former study but sought to glean rich, detailed accounts of the technology's influence on educational systemic inequities throughout the COVID-19 pandemic and beyond. Data was collected via a two-hour focus group comprised of Minnesota district technology coordinators using video conferencing technology (Zoom). Technology directors were invited through e-mail to participate in the study. Eight directors affirmed participation, two requested to email their responses, and one did not join the Zoom meeting. Five technology directors, serving districts in the seven-county metropolitan area, participated in a focus group to discuss how their districts leveraged technology to navigate the pandemic, what they have learned in the process, and what practices they will sustain moving forward.

Focus Group Protocol

The focus group protocol was founded on identifying how underserved student populations' needs were identified and addressed (Gorski, 2021). The protocol consisted of eight open-ended questions designed to guide but not limit conversation (Patten, 2014), allowing the researcher flexibility to edit or adjust questions based on participants' responses and unique experiences and perspectives (Creswell, 2014; Merriam, 2015). Throughout the focus group, the researcher utilized follow-up questions such as "tell me more," and "you mentioned" to clarify and gather a rich, descriptive, and complete narrative. The interview process allowed the researcher to "respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic" (Merriam, 2015, p. 90). The focus group questions used in this study are listed below.

Focus Group Questions

1. Can you share any surprising or unexpected things that you learned while educating students remotely or hyflex during the pandemic?

2. How did your school utilize technology to address SES inequities during the pandemic?

3. How did your school utilize technology to address racial/ethnic inequities during the pandemic?

4. How did your school utilize technology to address (dis)ability related inequities during the pandemic?

5. How did your school utilize technology to address mental health-related inequities during the pandemic?

6. Of these practices, what have you sustained?

7. Were there any practices or initiatives that you tried or implemented during the pandemic that you stopped using or discontinued using?

8. Is there anything else you would like to add regarding serving students and families during the pandemic and practices that have been discontinued or sustained?

Data Analysis

Once the focus groups were completed, Zoom recordings were transcribed using a transcription service. The transcripts were reformatted into a two column table and participant identifiers (names, district name, school name, location) were removed to protect confidentiality. The left-hand column contained the transcribed text from participants, divided into stanzas as recommended by Saldaña (2014) for easier analysis. The right-hand column contained space to record codes.

The transcripts were read, highlighting key ideas in each stanza. A different color was used for each participant's responses. The highlighted portions were then re-read and a code containing the ending "ing" was used to summarize the main idea expressed in the stanza. This method is called *process coding* and is used to capture "human actions, mental processes, and conceptual ideas" (Saldaña, 2014, p. 8). Process coding was chosen as an analysis tool because the research questions for this study focused on actions. Gorski's (2018) framework was conceptualized during the coding process, looking through its lens for specific actions school districts implemented related to educational systems or district structures to address inequities and better serve students and families.

Once the initial reading and coding was completed, a second researcher read the transcript and indicated her own codes to ensure inter-rater reliability. The two researchers met to debrief and discuss areas of discrepancy and agreement. Codes were then placed into sub categories to identify concepts that emerged in response to each focus group question. Concepts were also labeled using ending "ing" to denote actions taken. Finally, codes capturing participants' responses were reorganized by research question. A discussion of the results follows.

Findings

Study 1 of the research project found that the majority of districts were confident in responding to technical needs such as providing devices and internet or Wi-Fi hotspots to families, but less confident in successfully addressing behaviors such as absenteeism, parental support, and technology competency. Findings highlighted inequities discovered during hybrid and distance learning, such as poverty beyond the digital divide, broadband for rural communities and large families, mental health needs, resource implications related to sustaining technology initiatives, and systems inequities for marginalized populations. Additional research was warranted to gain deeper insights and understandings of how disparities experienced by underrepresented groups were addressed as well as the long-term implications.

RQ1. How have schools leveraged technology to address inequities during the pandemic?

Providing Students Technology Devices and Ensuring Students Have Adequate Internet Access

Districts used a variety of approaches when providing devices. Most districts had one-to-one (1:1) initiatives in place for some, if not all, grade levels. One participant credited, "Our intentionality on why we've had that one-to-one programming from the beginning is to navigate and address the socioeconomic challenges of digital access within our wide community that we serve." It was common for districts with 1:1 initiatives to have a mixture of devices, such as iPads for the lower grades and Chromebooks for upper grades. Districts without 1:1 scrambled to secure devices that could be "repurposed" and checked out to students as needed. Districts distributed devices to students' homes via buses and other modes of transportation.

Districts assisted students and families, and in some cases, staff members, in gaining access to the internet during the pandemic. Participants explained that some district families relied on public, community access to the internet at libraries or apartment complex community Wi-Fi centers, which resulted in being "locked off and excluded" from access during the pandemic shutdown.

Districts collaborated with local internet service providers (ISP), and expended COVID relief funds (ESSER) to provide homes with hotspots. A participant responded, "We had to basically get in line with every other district and leverage our relationship with Verizon to get more pucks. So we have probably about 450 pucks in circulation to close that internet achievement gap." Depending on community connectivity, districts purchased as few as 50 hotspots and as many as over 1,000 units. Participants acknowledged that tremendous technology challenges remained when two or three students in the same family were trying to access the internet for online

learning. A technology director shared, "We wound up trying to double up on that, providing maybe two hotspots per family to accommodate the number of students who were there . . . other folks in the home who were taking advantage of that internet access as well, that was another reality that we encountered."

Identifying, Addressing, and Monitoring Families' Needs

Districts initiated efforts to gather data and address family needs as their school community navigated the pandemic. A participant explained the technical aspects: "We did a lot of engagement and survey opportunities, and application processes to identify who needed internet access at home." He explained that data was utilized in new ways: "[We] gathered a lot of data and actually put some of that data into some of our dashboarding and mapping analytics tool to see a variety of different strategies."

School districts strove to meet families' unprecedented technology needs during online instruction, "We had to . . . teach a family how to care for a school device." Another participant added, "We created remote tech support. So we started with two locations in our district . . . a drive-up service, but we also added a remote service . . . we would do the triage over the phone, and then we would come and swap out your device for a new device while we repaired it."

The necessity to utilize technology to engage with families through the pandemic led to improved parent engagement practices. Districts discovered that video conferencing removed barriers and created greater access for families, which increased participation in conferences and IEP meetings. One participant shared that his district invested in a phone two-way text communication tool that translated messages to/from school and home language, which effectively engaged multilingual families.

Collaborating to Serve Students Receiving Special Education Services

Participants described the technology staff as a "team partner" with special education teams guiding adaptations required to serve students throughout the pandemic. Assistive technology tools such as add-ons to Google Chrome for reading material texts, text-to-speech readers, and magnifying glasses were delivered to homes. One participant explained that some students receiving special education services, specifically students on the autism spectrum, thrived in an online learning environment. They "loved the structure that all teachers were doing the same thing, and he didn't have to figure out how to get up and get himself dressed and get to the place on the time where the thing was changing and the rules weren't always set."

Participants highlighted districts' investment in building teachers' capacity to meet the needs of students receiving special education services when learning online. A director explained, "I think we did spend a good amount of time . . . trying to create professional development opportunities and resources that teachers could tap into. We did try to create resources around, 'What does adaptive lesson planning look like?' and 'What do you need to be cognizant and aware of when you're creating digital lessons?'"

Pausing Mental Health and Diversity, Equity, and Inclusion (DEI) Initiatives

Study participants provided limited responses when asked how technology was leveraged to meet students' mental health and well-being needs through the pandemic. Traditional resources, such as individual and small group student meetings with a school counselor continued remotely via Google Meet. One participant shared that in his district, there was an attempt to offer virtual calming rooms, or virtual meditation spaces, but it was not a systematized or central office initiative and eventually faded out. Participants admitted that mental health "seemed to become more of a priority" after returning to in-person learning and realizing the challenges being faced by staff and students.

As school districts' energy and resources were instantaneously focused on providing a remote learning model, other initiatives were paused. This was particularly the case for diversity, equity, and inclusion efforts. A participant explained that his district was "thrusted into an environment that was completely unknown, and a lot of staff not knowing how to engage and instruct in that space." The phenomenon was described: "Our staff moved into . . . emergency instruction . . . less amount of processing around cultural awareness or opportunities to embed and ingrain culture, and more of almost reverting back to the basics . . . mostly White Eurocentric staff makeup." Districts reported that they re-engaged with diversity, equity and inclusion work post-pandemic: " I watch our cultural activities, and festivities and recognitions coming back, really, in full force and even amplified within our district, and what we see with cultural nights and cultural days has been amazing."

RQ2. What technology-related practices, initiated during the pandemic to better serve underrepresented populations, have been sustained post-pandemic?

Experiencing Success in the Online Learning Environment and Choosing to Remain a Remote Learner

When technology directors considered what practices they have sustained, one emerging theme was the preference for a remote learning modality even after the pandemic. "We came out of the pandemic and started a

fully certified online school." Many districts created an online version of their school district to run in tandem with their traditional in-person instruction.

There was an acknowledgement that remaining in a remote learning modality is what is best for some students, including those with disabilities, multilingual learners, and learners from a variety of cultural backgrounds. "There was a real eye-opening around special education in particular, that distance or online learning is actually a better situation for some kids with special needs, particularly kids who have social issues around anxiety or overstimulation, or kid-on-kid interactions," one participant explained. Another remarked, "EL population also had some surprises in terms of a mindset change of 'EL students can't possibly do well in online learning,' to some EL students actually thriving in an online environment because they're surrounded by their family." Technology directors have learned that families can be served better by providing multilingual supports. One director said, "We hired a family support technician who's bilingual, and she is wonderful and is our first person to work with families along with our parent portal that we put in place."

As remote instruction moves from emergency response to planned, high-quality learning experiences, teachers have begun to utilize the virtual classroom as a space to encourage cultural exploration with their students. "It's been fascinating to watch as they have engaged culture, and looked at how to bring culture within that unique learning space, and how to try and create some of that community and engagement in very different ways that didn't happen during the pandemic."

Expanding Effective Technology Use in the Classroom and Refining Teachers' Technology Skills

School districts acknowledged teachers' steep technology learning curve at the start of remote learning. Participants shared admiration for the gains and a desire to sustain effective instructional technology practices, tools, and platforms. Technology directors highlighted an increase in Chromebook distribution to students, especially at the secondary level, and Google gained popularity as a software platform as a direct result of the pandemic. One director reflected, "We were a Google district prior to that, but this really forced us to jump in at the enterprise level." Another explained a change in mindset, "We said we have to have chat and Google Meets open, where students can create a Meet and can chat with each other, because it's part of the learning process."

Teachers appear to be honing their technology expertise. They are posting to learning platforms at a greater frequency and exploring how software such as GoGuardian can be used to enhance classroom management at a distance. The use of software in the classroom is an evolving conversation moving from technical skill to

effective pedagogy. "Evolving is deeper, more rich conversations about how to effectively integrate technology, and being more intentional on technology for intentional purpose rather than technology for technology's sake."

Reimagining Schools, Protecting Student Privacy, and Advocating for Continued Funding

Technology directors expressed optimism for the opportunity to reimagine school as a consequence of the pandemic. One participant pondered, "There's the ability to facilitate, but there's also reimagining." Another finished the thought, "We're really trying not to do school the same way we did school before." They reflected upon the role of innovation on instruction, what learning means, and what challenges persist. Participants expressed that much change has occurred as a result of the pandemic and school systems are still grappling with the impact of this change. Lingering difficulties and new opportunities coexist. Leaders are questioning: "What skills actually need to be acquired through school, and what skills might be better accessed in other ways?" This is addressed by "rethinking instruction, what learning means, and how we engage."

A second practice sustained at the school or system level post pandemic was the need to protect student data and privacy. Minnesota Governor Tim Walz (2022) enacted the *Student Privacy Act* which called for greater accountability of the privacy and protection of student data collected through school issued devices (Practical Law Data Privacy & Cybersecurity, 2022). This piece of legislation was needed; as one participant stated, "There are nefarious actors out there who would like to get ahold of that data and sell it, no matter how small it is, even if it's a name and birthdate and generate social security numbers with bots, and now you've got an identity and you can utilize it." The increase in application use during the pandemic led to the increase of data needing to be protected because students were told to "go ahead and sign into this app and that app, and that app, and that app." Widespread use led to an "open season across the country and world, and now not only do we have to roll it back, but we also have to provide funding to secure data." It costs money to protect student data and is a budget item that is easier to fund in districts that have more money. This leads to the final theme that emerged at the school and system level: money.

"Funding matters." Technology directors advocated for a continued funding stream to education. Directors affirmed that funds need to be allocated to address student privacy, but not at the expense of something else. The necessity of public school funding needs to be acknowledged and provided for both at the state and federal levels. A participant expressed the fearful reality that "it took a pandemic to fund education, and now the money's going to go away for many people in many organizations, in many districts."

Conclusion, Discussion, and Implications

Summary of Findings

In order to address the technology inequities–often referred to as the digital divide–discovered during the pandemic, districts employed a variety of methods to distribute devices and provide widespread internet access to students, families, and teachers. Districts utilized applications and surveys to identify families' technology needs. Strategies included partnering with local internet service providers and using Elementary and Secondary School Emergency Relief (ESSER) funds to purchase hot spots. Instruction and training on device use was provided through means of video conferencing, text communication, and multilingual supports.

Qualifying students continued to receive special education services remotely during the pandemic. Accommodations were provided using assistive technologies paired with adaptive lesson plans specifically designed for individual and/or groups of students. Efforts were made by districts to remotely address the mental health needs of students. However, initiatives often lacked district-level planning and focus. Therefore, students' mental health and well-being became a significant priority when learning resumed in person.

Many districts emerged from the pandemic with the intention to establish a permanent, fully online school due to the fact that some students thrived in the remote learning environment, such as English Language Learners and those with certain disabilities (i.e., students on the autism spectrum). There is greater widespread use of technology in the in-person classroom following the pandemic, including devices such as Chromebooks and software such as Google Meets. Educators had to improve their technology expertise to meet the demands of a more integrated classroom. As districts continue to process the impact of the pandemic on teaching and learning, they are advocating for continued technology funding while working to protect student privacy.

Discussion of Results

The pandemic prompted progress toward addressing educational inequities, but there is still much work to be done. Technology directors were aware that students needed both a device and access to the internet to enable learning from home. This is consistent with research on the topic (Evans & Annan, 2018; Hall et al., 2020; Tinubu & Herrera, 2020; Male & Burden, 2014). It was acknowledged that different families need different supports. Some families, for example, were provided with multiple hotspots and devices in order to supply robust connectivity.

Historically, school systems have not had the structures to meet students' mental health needs well (source). A gap remains between those experiencing mental health issues and those receiving access to care. The

CDC (2021) highlighted declining mental health rates during the pandemic, especially for girls. Participants in this study noted that, despite attempts to serve students using video conferencing technologies, mental health only became more of a priority after returning to in-person instruction.

School districts were challenged with how to best meet the IEP service minutes and goals in remote learning models. There were unexpected benefits to remote education for students and families. Video technology made IEP meetings more accessible and convenient, which led to increased attendance (Morando-Rhim, & Ekin, 2021). Some students with disabilities, particularly those who struggled with social cues during an in-person school day, thrived within the online environment. Districts need to provide assistive technology both at home and school as well as ongoing training for teachers in order to meet the needs of students with disabilities learning remotely.

Implications for Practice

School age children throughout the nation faced disruption to their learning during the COVID-19 pandemic. Disruptions had the most severe consequences for historically marginalized students (Harris & Jones, 2020). As districts scrambled to address inequities and meet community needs, the necessity of a robust and flexible learning infrastructure was realized: an infrastructure "capable of supporting new types of engagement and providing ubiquitous access to the technology tools that allow students to create, design, and explore" (Office of Educational Technology, 2017, p. 69). Findings informed the creation of the equitable technology infrastructure model.

Table 1

Equitable Technology Infrastructure Model

Reimagining Schools for All Students' Success		
Effective Instruction	**School-Home Partnership**	**Law & Policy**
- Expanding effective technology use in the classroom and refining teachers' technology skills - Experiencing success and choosing to remain a remote learner - Collaborating to serve students receiving special education services - Prioritizing mental health and diversity, equity, and inclusion	- Identifying, addressing, and monitoring families' needs - Providing students technology devices and ensuring students have adequate internet access	- Protecting student privacy - Advocating for continued funding

Note. The Equitable Technology Infrastructure Model encompasses the actions school districts must embody to serve all students and families well.

The post-pandemic focus of the vast majority of educators' has been on the loss of opportunity: learning loss, increased gaps, and a mental health and well-being crisis (Dor et al., 2020). Alternatively, challenges brought on by the pandemic may be viewed as new opportunities for school systems to acknowledge shortcomings and do better. As districts return to in-person learning, the open mindset to reimagine school systems must be maintained. The steep technology-related learning curve at the start of the pandemic cannot become a plateau. School districts must provide resources for continuous staff development in technology-related skills and pedagogy. In addition, districts need to ensure families have internet access, devices, and assistive technology tools. This is imperative for students from historically under-served groups that benefited from the online learning environment. Educators should advocate for continued funding for technology-related improvements to student learning experiences as well as understand and address the legal requirements to protect student privacy. Finally, districts should partner with

outside agencies to advance social justice initiatives that stalled during the pandemic (mental health and racial/ethnic disparities).

Implications for Future Research

There are implications for further study in the areas of technology, academia, and pedagogy. Because of their experiences during the pandemic, teachers now have the capabilities to move beyond the basics of operating devices into advanced ways of integrating technology into their teaching methods. Some members of the teaching profession will spend their entire careers teaching in online environments, necessitating research focused on new approaches to pedagogy and classroom management. Consequently, additional research is needed for academia to adjust preparation programming for future teachers and leaders to adapt to this changing landscape.

Given the equity literacy framework's tenet to identify and address educational inequities, there is a need for continued research focused on the use of technology to address inequities experienced by students and families in underrepresented groups. This qualitative, focus group study emerged from an initial mixed-method survey study. The small focus group size allowed ample opportunity for participants to verbalize responses, resulting in rich, thick narrative. All participants served as district technology directors within the seven-county metropolitan area of Minneapolis and St. Paul, Minnesota. A larger sample size, such as a regional or nationwide study, inclusive of rural technology directors, could elicit a broader array of perspectives. Codes expressed in the focus group were corroborated by multiple participants, and concepts that evolved in this study were based on repetition. However, given the limited sample size, it cannot be certain that saturation was reached and all concepts were exhausted in response to each question.

This study implemented purposive sampling of district technology directors. A study inclusive of participants with a range of educational roles, such as teachers, parents, and students, would include diverse experiences and, potentially, more robust findings.

Finally, a longitudinal study may more accurately determine which practices implemented during the pandemic were sustained, or sustainable. A specific area of interest is the increase in online schools. A longitudinal study would better explain the mental health and well-being of students and families following the pandemic. There would be value in learning if culturally responsive practices fully recovered from the pandemic pause.

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