Distance learning during the early stages of the COVID-19 pandemic: Examining K-12 students' and parents' experiences and perspectives.

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Abstract. This study examines K-12 students and parents in the United States' experiences and challenges during the sudden shift to distance learning during the spring of 2020. The study also aims to analyze what can be done to better educate students in the case of continued distance learning during the COVID-19 crisis and during future emergencies. The study was conducted with an online survey of K-12 students and parents in the United States, and both qualitative and quantitative data was collected. However, the results should be interpreted with caution, as it was a smaller study that is not a representative sample of the population. The study results show that a variety of strategies were utilized to teach students online, and that from the perspective of the participants both successful and unsuccessful methods were utilized.

Keywords: distance learning, online learning, remote learning, virtual learning, COVID-19

1 Introduction

90% of schools worldwide closed this spring due to COVID-19, and thus began the largest distance learning experiment in history [1], [2]. Distance learning is a method of instruction where students and teachers are not in the same physical classroom. In 2020, distance learning is often enabled by technological tools that are both synchronous (live) and asynchronous (student-paced). The term is often used synonymously with e-learning, virtual learning, remote learning, and online learning, although online learning can take place in the traditional classroom environment as well. Until the spring of 2020, most fully online courses were offered in the higher education setting, with only a small percentage of PreK-12 students taking classes at a distance [3], [4].

2 Literature Review

A limited body of recently published research exists on the move to distance learning in the wake of the COVID-19 crisis. However, the research is primarily focused on teachers' experiences and teacher professional development, rather than students' and parents' experiences [1], [5], [6], [7], [8], [9], [10], [11]. This study fills this gap by focusing on the experiences of students and parents in the United States during the

sudden shift to distance learning during the COVID-19 pandemic and addresses how those experiences can inform teachers and schools so they can better meet the needs of students and families during the upcoming school year and into the future. This literature review analyzes the research on online and distance learning, primarily in the PreK-12 environment, from 2015 to 2020.

Although there is very limited research about distance learning during the recent pandemic, there is more research about distance learning in general. However, the research on distance learning in PreK-12 is still limited compared to the research on distance learning in higher education. The existing research shows that distance learning in the PreK-12 setting presents many challenges but can be successful if used effectively and in partnership with parents or guardians. In typical circumstances, it can also present opportunities that students would not have had before, such as taking classes not offered at a student's school or offering instruction to home-bound or hospital-bound students [3], [12], [13], [14]. Distance learning can provide more flexibility to both teachers and students, such as self-paced instructional materials and anytime, anywhere participation in the learning process; learning is no longer confined to the school building or school hours [15], [16], [17]. Distance learning also can allow instructors to more effectively differentiate instruction and materials for learners [15], [16], [18], [19]. Additionally, fully online school environments can be better for students who struggle in a typical school environment, such as students who are bullied [17], [18]. Distance learning allows the parent to have more involvement in the child's education, and of course, allows for continuation of learning in unforeseen circumstances such as COVID-19 where students cannot attend school in person [11].

Some of the challenges of distance learning include lack of teacher preparation and training [3], [14], [15], [16], [20], [21], [22], [23], [24], [25], paucity of home support [1], [9], facilitating communication and relationships at a distance [4], [15], [17], [26], and engagement and attrition rate [11], [14], [16], [21]. Although research supports these assertions in distance learning programs that are intentionally chosen by a teacher or student's family, the move to required, fully online learning due to a pandemic is a situation that requires a different approach and more thoughtful consideration.

2.1 Benefits of Distance Learning

The concept of distance learning is not new, but taking courses over the internet, or online learning, has only existed in the PreK-12 environment for about twenty years [15]. Although only a small percentage of U.S. students are currently enrolled in virtual schools, the number has been growing exponentially each year [14]. With the advent of new technologies and an increasing number of students who cannot attend school in a typical fashion for various reasons, more and more families have turned to online classrooms to provide or supplement their child's education. Successful programs combine student preparation and guidance in self-paced learning with support systems, parent engagement throughout the process, high-quality curriculum and skillful online teachers [3].

Distance learning can offer students opportunities that they would not otherwise have. For example, students can take courses that are not offered at their physical school online instead, such as Advanced Placement or foreign language courses [12], [13], [15], [17]. Many schools are unable to offer these courses due to budget limitations or shortage of qualified instructors [13]. Lack of course offerings can especially be an issue in underserved school communities, such as urban and rural schools. Online course offerings can help fill this gap and allow students to take courses that are less likely to be offered at their school, such as Advanced Placement and STEM courses. Students who are hospitalized or home-bound can also continue

their education online [17]. Distance learning gets parents more involved in their child's education because they see the work that their student is doing; many parents use an online program in conjunction with a homeschool curriculum [17].

Another benefit of distance learning is flexibility. Students who are competitive athletes, actors or actresses, or whose parents travel full-time benefit from the ability to learn anytime, anywhere [15], [16], [17]. "It really makes the entire world the classroom for the students. It does not need to be confined to the 8am to 3pm day of school, nor does it need to be in a particular building" [15].

Differentiation and personalization are pedagogical opportunities presented by distance learning. "It gives the teacher the ability to design and deliver a course that will fit the students' learning patterns and interests" [15]. In an online environment, students are able to self-pace their work based on their own needs [16], [18], [19]. Online learning also lends itself to mastery-based instruction, where students move forward in the curriculum based on mastery of the material rather than seat time. Distance learning courses often provide students with a personalized learning experience so they can master the material at their own pace [18].

Distance learning can be a helpful option for students who struggle in a typical school environment. Students who are bullied due to their sexual orientation, being differently abled or experiencing a learning difference often benefit from attending a virtual school [16], [17], [18]. Students also may prefer online courses if they attend a low-performing school or perform better without the distraction of their peers. "One student explained that she enrolled in an online course specifically to be distanced from her peers because she found them to be distracting in her brick-and-mortar school" [18].

Finally, learning at a distance allows students to continue their education during unforeseen circumstances, such as during Hurricane Harvey or the recent COVID-19 pandemic. Distance learning is particularly important so students can stay engaged in learning during emergencies like natural disasters or extreme violence [11]. Although crises can present other challenges, online learning has the potential to allow students to continue receiving instruction and participating in classes until they are able to return to school.

2.2 Challenges of Distance Learning

Although distance learning has many benefits, it is not always effective. Some of the challenges facing online learning environments are teacher training, student home support, establishing relationships in the virtual classroom, maintaining student engagement at a distance, setting educational policies related to online learning, and lower test scores than their brick-and-mortar counterparts. Since online learning is such a new phenomenon, students, families, teachers, and institutions are still trying to figure out how to overcome these issues.

"We cannot assume that educators are prepared for the challenge of navigating new environments that may have different rules and roles and require new pedagogical approaches from those of traditional face-to-face classrooms" [24]. One of the greatest challenges facing online education today is lack of teacher preparation to teach in fully online environments. Less than 2% of teacher education programs in the United States cover teaching online, and very few teachers have experience instructing in a fully online environment [15], [21], [23], [25]. "Traditional methods for preparing educators to teach are not sufficient or appropriate for [...] online learning environments… [it] requires different pedagogical approaches than teaching in face-to-face learning environments… [such as] learner-centered theories, teaching and learning methods, and methods for evaluating learning outcomes" [21]. In order to improve the quality of distance education programs, schools first must prepare their teachers by providing training over not just technological skills but the unique

pedagogy of instructing in an online environment [3], [16], [20], [21], [22], [23], [24], [25]. According to Buelow et al., "it is a mistake to think that the creation of effective online courses is a matter of simply transferring classroom content, assignments, and exams to a web-based setting" [27].

A lack of support at home can be another major challenge, particularly for students who did not intentionally choose to transition to a distance learning environment. Parents who are home may be working or may not be home at all. Parents also may not be able to speak English or may not know how to help their student with academic materials or the technology. There also may be multiple other siblings at home, or the home may not have a quiet place for the student to study [1], [9]. these are less likely when the family chooses for their child to enroll in a virtual course or take classes online, issues such as these can still sometimes present a challenge.

A downside to fully online schooling is the lack of face-to-face relationships that are fostered between the teacher and student and the student and other students [4], [15], [17], [26]. "A lack of a sense of community [...] exists among virtual school students" [17]. These challenges can be addressed by providing in-person events and meetups when possible, but often distance learners cannot meet up physically due to location or illness. Classroom relationships and a Community of Inquiry (CoI) can be fostered through live video meetings, discussion boards, virtual social activities, and social presence of class members, but it takes more effort to foster a sense of community than it does in the physical classroom. Because of this, some researchers express concerns that online learners may become isolated [15].

Student engagement is another challenge in a distance learning environment. Attrition rates are high in virtual schools, suggesting that students are not as engaged in the distance classroom as they might be in a brick-and-mortar setting [14], [16], [21]. Without the personal touch of teachers who meet with their students in person, it can be challenging to keep students engaged and progressing in the course or program [14]. Teachers who are highly trained in online teaching may be more likely to utilize engagement strategies to retain students in their courses [16], [21], [28], further highlighting the need to adequately train teachers about how to instruct in the distance environment.

"Current educational policy continues to struggle to keep up with the ever-changing landscape [of K-12 distance education]... across the nation, states are grappling with how existing policies aligning with traditional education apply to learning in an online environment" [12]. Existing school policies, which are usually based on traditional in-person daily attendance and seat team requirements, do not line up with the anytime, anywhere, mastery-based nature of online education. Effective regulations for virtual schools and the licensing of online teachers have been a related challenge. Some states have successfully put legislation into place regarding online learning, but many states still lag behind the rapid development of technology and the growth of virtual schooling [12,] [16], [17].

Research on the effectiveness of distance learning when it comes to test scores is also often mixed, and many studies have not shown positive results for virtual schools. The majority of studies so far have found that distance learning is not as effective as in-person instruction or blended models [16], [17], [18]. "Results indicate that the scores of students in online schools and the accountability scores of those schools significantly lag behind those of brick-and-mortar schools. This is particularly troublesome given the rapid pace at which online learning is growing" [16]. However, some of this data may be influenced by the fact that many virtual schools and online courses cater to students who need remediation and are taking the course to make up credits, and therefore may be more likely to perform poorly in any program. "They've struggled before, and it's no different when they take an online course" [12]. However, other studies have found that fully online courses are at least as effective as

those taught in-person, and that they can be even more effective for some students [17], [19], [29].

2.3 Unique Considerations Due to COVID-19

Arguably the greatest challenge in the sudden move to distance learning in the wake of the COVID-19 pandemic has been the lack of access to WiFi and devices that has impacted so many students. These students did not choose an online education, and thus may not have what they need to successfully participate in virtual learning. Approximately 19 million Americans still do not have access to broadband internet, and one-fourth of Americans living in rural areas do not have internet access [29]. Many families also do not have a device other than a smartphone or may have one device that multiple children must share or that a parent needs to use for work [1], [9], [11].

Parents who are working at home may not be able to help children with schoolwork during the day, because they are working from home or are essential workers outside the home [1], [9]. Students may also have to supervise their younger siblings if their parents are not available or may have taken a job to help out their family. The digital skills of parents may be lacking, so they could be unable to help their child(ren) with online schoolwork [1], [9], [11]. Many families are also experiencing other traumas, such as job losses and sick family members, that impact the children's ability to focus on schoolwork [1], [9], [11]. "In emergency settings, students may experience trauma, lack typical services provided by schools (e.g. meals, IEP providers and supports), and lack electrical power, access to technology, or reliable internet" [11]. It can also be challenging for young children, who have shorter attention spans and favor hands-on learning activities, to learn via technology [10].

In addition to challenges at home, due to the sudden nature of school closures during beginning stages of the COVID-19 pandemic, many teachers and schools did not have sufficient time to prepare to effectively provide an education at a distance [1], [9], [11]. Schools and districts did not have time to adopt the technology tools needed, such as a centralized Learning Management System if they did not already have one, or to train teachers on how to effectively deliver instruction from a distance.

> "[Teachers] felt overwhelmed and unprepared to use online or remote teaching strategies and tools and they struggled to adapt their pedagogy to fluctuating situations… Participants reported needing support shifting their practice… This study showed that the lack of preparation, training, and support the participants had for designing quality instruction with technology created additional stressors and barriers to teaching and learning remotely in times of need" [11].

Many districts also did not have time to figure out how they would provide instruction for students who did not have a device or internet at home. Many schools sent home all of their school-owned devices and WiFi hotspots, but still had large percentages of students who did not have access [9].

Despite the many challenges, a benefit to the move to distance learning during the COVID-19 emergency was the preexisting relationship between teachers and students. Because students already knew their teachers and classmates and had spent the majority of the school year with them in many countries, such as the United States, it was easier for teachers to continue instruction and maintain those relationships with students and parents. It was also easier for teachers to partner with parents as they took on the child's education together since they already knew them from the physical classroom [1].

Although distance learning faces many challenges, especially during an emergency such as COVID-19, it allows students to continue their education in a situation where otherwise they would be unable to [11]. Online learning also promotes aspects of innovative, student-centered pedagogy such as technology skills, student-paced and mastery-based instruction, personalized learning, and student voice and choice [4], [21], [22], [24]. Distance learning also presents many students with opportunities they would not otherwise have and the flexibility to learn anytime, anywhere. However, the research shows that teachers and students must operate differently than they do in a regular classroom context in order to be successful in online environments. "Well-intentioned schools frequently enact poorly designed online learning programs. The experiences of those impacted by such programs - school administrators, teachers, students, and parents - confirm or create beliefs that online learning doesn't work, even if counterparts in other schools are proving otherwise" [3].

It is crucial that teachers are provided training specific to online instruction so they can provide the best possible learning experience for students [13], [15], [27], [28]. Teachers should learn instructional strategies and tools that can be effectively utilized in online classroom settings. In addition to technological know-how, important pedagogical strategies that will make online learning more successful include engaging students, creating instructor presence, facilitating student communication and community, and assigning an appropriate workload [3], [26], [27], [28]. It is crucial that pre- and in-service teachers are provided with this meaningful and sustained professional development related to teaching online in order for online learning to be effective. Students and families also need schools to better address their academic and social-emotional needs. This research focuses on the specific needs of students and families during distance learning in the COVID-19 pandemic and will inform schools about what can be done to best prepare teachers to successfully meet those needs. This research is a necessary step in helping schools understand students' and parents' experiences with distance learning during the early stages of the COVID-19 pandemic and what they need to do to improve future distance learning.

3 Methodology

This study aimed to explore how PreK-12 students learn at a distance, what strategies and tools are most successful, and what challenges they face related to learning at home during the COVID-19 crisis. Further, it examines what should be done to better educate students remotely in the case of future emergencies. The questions were developed to get feedback on what strategies and tools parents and students liked and disliked, how much synchronous and asynchronous instruction they preferred, the workload they preferred, and their feedback on what their school or teacher did well and what could have been done better. The survey questions are included below. The research questions were as follows:

1. What strategies and tools are being used to teach online during the COVID-19 crisis?
2. What strategies and tools have been most successful? Least successful?
3. What are the challenges faced by students and families related to at-home learning during the COVID-19 crisis?
4. What should be done to better educate students in the case of continued online learning or future emergencies?

3.1 Participants

This study was conducted with University of North Texas IRB approval, and an online survey was utilized Prior to entering the online survey, participants were informed about the study's purpose, possible benefits and risks and confidentiality. No compensation was provided for participation in the study. A total of 155 individuals participated in the study. Participants were the parents of Pre-K through 12th grade students as well as 4th through 12th grade students themselves. Participants were both male and female and ranged in age from ten years old to adults, with most adult participants in their 30s and 40s and most student participants in middle and high school. Participants primarily came from private, public and charter schools in Texas, with 73% of respondents from private schools and 27% from public or charter schools. This is not a representative sample of the population of Texas or the United States, as the majority of the population attends public or charter schools.

3.2 Materials

The survey was distributed online and taken using Google Forms. The survey consisted of 34 multiple choice, multiple selection and open-ended questions, along with opportunities for additional comments or information after each survey section. Parents of more than one student took the survey once but were able to select multiple answers to questions when applicable. The survey was divided into six sections: introductory questions, online learning tools and strategies, video conferencing, online learning workload, access to WiFi and devices, and a conclusion. The study was designed to get feedback from students and parents that will help schools and teachers improve their online learning offerings.

Table 1., Online Learning During COVID-19 Survey

Section	*Question*	*Answer Choices (if applicable)*
Introductory Questions	What grade level(s) are you (or is your child) in? [Select all grades you have children in if they are in multiple grades]	PreK – 2nd, 3rd – 5th, 6th – 8th, 9th – 12th
	What type of school do you / does your child attend?	Public, Private, Charter
	How long have you / your child been learning online? (If you have finished the school year, how long did you / your child learn online?)	A week or less, 2 – 5 weeks, 6 – 9 weeks, 10 weeks or more
	Overall, do you / your child like online learning?	Yes, it's okay, no
	What do you like about online learning? Please explain.	
	What do you dislike about online learning? Please explain.	
	Do you feel like you / your child are learning as much as in the regular classroom?	Yes, No
Online Learning Tools & Strategies	What Learning Management System do you / your child use? [Select all]	Google Classroom, Seesaw, Schoology, Canvas, Moodle, Blackboard, None, Other
	What other digital learning tools have your teacher(s) / your child's teacher(s) used during online learning? [Select all]	Various Options (e.g. Adobe Spark / Canva, Book Creator / Pixton / Storybird, BrainPOP / BrainPOP Jr., Discovery Education, EdPuzzle, etc.)

	Which tools do you like best for online learning? Why do you like them?	
	Which tools do you NOT like for online learning? Why do you dislike them? [Optional - Skip if you like all tools used]	
	What instructional strategies have your / your child's teacher(s) used that have worked well?	Various Options (e.g. Live videoconferencing, Teacher-recorded instructional videos, Adaptive learning programs, etc.)
	What instructional strategies have been used that have been successful? Why have they been successful?	
	What instructional strategies have your / your child's teacher(s) used that have NOT worked well? [Optional]	[Same as instructional strategies above]
	What instructional strategies have been used that have been unsuccessful? Why have they been unsuccessful? [Optional]	
	How do you feel about the communication from your / your child's teacher(s) during online learning?	There is too much communication, There is a good amount of communication, There could be more communication, There is no communication
	What communication strategies have your / your child's teacher(s) used during online learning that have worked well?	Email, text messages, phone calls, Google Classroom Announcements, Seesaw, Class Dojo, Remind, Bloomz, None, Other
Section	*Question*	*Answer Choices (if applicable)*
	What communication strategies have your / your child's teacher(s) used during online learning that have NOT worked well? [Optional]	[Same as communication strategies above]
Video Conferencing	Do your / your child's teacher(s) host live meetings over video conference?	All my teachers / my child's teachers have some live meetings, Some of my teachers / my child's teachers have live meetings, None of my teachers / my child's teachers have live meetings
	If your / your child's teacher(s) use video conferencing, what platform do they use? [Select all]	Google Meet, Zoom, Microsoft Teams, Other
	If your / your child's teacher(s) have live video conferences, what are they for? [Select all]	Office Hours / Q&A, Class discussions about academic topics, Go over the assignment instructions for the week, Review for tests, Say hi / catch up with classmates, Other
	If your / your child's teacher(s) have live video conferences, how do you feel about them?	I like them, They are fine, I do not like them
	If your / your child's teacher(s) have live video conferences, about how often do they have them?	Every day, A few days per week, Once a week, Every other week, Less than every

		other week
	If your / your child's teacher(s) have live video conferences, how do you feel about how often they occur?	They occur too often, They occur a good amount, They do not occur often enough
Online Learning Workload	About how many hours per weekday do you / your child usually spend on assigned schoolwork?	Less than an hour, 1 - 2 hours, 3 - 4 hours, 5 - 6 hours, Over 6 hours
	How do you feel about the workload?	It is too much work, It is a good amount of work, It is not enough work
	When would you prefer assignments be posted?	Assignments posted daily and due by the end of the day; Assignments posted Monday and due by Friday, but with daily activities suggested; Other
Access to WiFi & Devices	Do you have high-speed internet (WiFi) at home?	Yes; Not at home, but we have access to it elsewhere; No
	What devices do you / your child have access to at home? [Select all]	Windows PC Desktop, Mac Desktop, Windows PC Laptop, Mac Laptop, Chromebook, iPad, Other Tablet (Android, Kindle, etc.), None of the above
	Do you have a printer at home?	Yes, No, Not at home but we have one we can access
	Do you have enough devices in your home for the people who need them? (computers or tablets, not phones)	Yes, No
	If not, what don't you have? [Optional]	
	Are there any devices or accessories that you feel would make online learning more successful if you had it? [Select all] [Optional]	More laptops, More tablets / iPads, A stylus or Apple Pencil to use with the tablet/iPad, Better WiFi, A printer, Other
Conclusion	What could be done by your / your child's school to better meet students' and families' needs during online learning? Please explain.	
	Other Comments / Information About Online Learning [Optional]	

3.3 Procedures

The online survey was distributed via email, a school's Learning Management System, and over Facebook. The aim of the study was to gather overall feedback on successful and unsuccessful strategies, methods and tools; challenges families faced; and how to improve instruction during a crisis. Many of the questions were open-ended, and many others were multiple selection questions; overarching themes were identified from the data and feedback on parent and student perceptions was summarized.

4 Results

4.1 Research Question 1: What strategies and tools are being used to teach online during COVID-19?

To better understand what methods were used to engage students online, participants were asked to report on strategies and tools used in their classrooms. The survey results showed that a wide variety of strategies were used. Common strategies included live videoconferencing (Zoom, Google Meet, Microsoft Teams, etc.), teacher-created instructional videos, other instructional videos (YouTube, BrainPOP, etc.), eBooks, adaptive learning programs (IXL, Achieve 3000, Istation, etc.), digital worksheets and assignments, communication and discussions (Fligprid, Padlet, etc.), and game-based tools (Nearpod, Quizizz, etc.).

Less variation was seen among the digital platforms used. 78% of respondents reported that Google Classroom was used as the digital platform for assignments, and 52% reported the use of Seesaw, as presented in Figure 2. A few respondents reported using other digital assignment platforms. Respondents were also asked to detail the specific digital tools that were utilized. The most common digital tools used by students were Google Docs / Microsoft Word (75%), IXL or other adaptive learning platforms (66%), eBook platforms like Epic! or Capstone (53%), Flipgrid video discussions (50%), Google Slides or Microsoft Powerpoint (48%), BrainPOP or BrainPOP Jr. (46%), Google Forms or Microsoft Forms (39%), and/or EdPuzzle (36%), as presented in Figure 2.

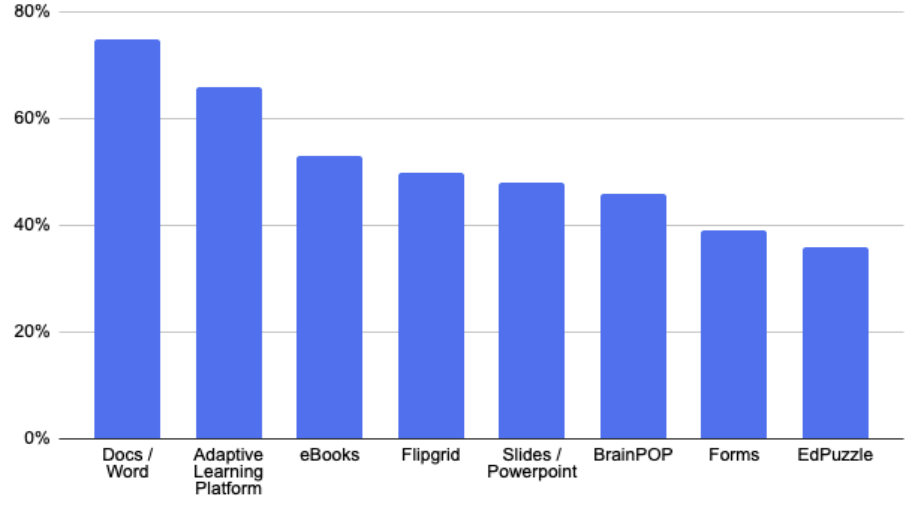

Fig. 1. Most Commonly Used Digital Tools

4.2 Research Question 2: What strategies and tools have been most successful? Least successful?

Successful Strategies. Many different instructional strategies were successful, from the perspective of the respondents. Preferred strategies included live video

conferencing (77%), teachers recording their own instructional videos (72%), other instructional videos such as YouTube or BrainPOP (63%), digital worksheets and assignments (51%), eBooks (43%), adaptive learning programs such as IXL (42%), and game-based learning tools such as Kahoot (23%), as seen in Figure 3. Other techniques that were found to be successful by some respondents included student-created digital or offline projects, virtual simulations and field trips, and offline worksheets.

Live meetings. Student respondents reported that they liked live meetings because "you can talk to your teacher without having to wait for a response on an email," and "it provides the opportunity to ask specific questions and interact with the teacher." Another respondent said, "I like how many of my teachers had class discussions through Zoom and used the breakout rooms to let us have smaller group discussions like we would with the other students sitting at our table."

Teacher-created videos and asynchronous activities. Teacher-created videos were also highly popular. Respondents mentioned that "it was nice to hear my teacher's voice," and "teacher explained videos help [me] grasp the concept." Many students also mentioned that they like teacher-created videos because "I can pause videos to get the notes down if I got a little behind," and they like how they "can be listened to more than once if something is missed." Parents reported that "the personal instructional videos were great for the kids to understand and be able to see their teachers," and "recorded videos were the best – my daughter could replay them or pause to focus on something she was struggling with." Another parent said, "we really enjoyed a combination between teacher-recorded videos and other ones like BrainPOP… we also preferred teacher-recorded [instruction] rather than Zoom so they could pace themselves." Like these parent respondents, many respondents mentioned that they liked the asynchronous, self-paced nature of distance learning. Another parent stated, "my children enjoyed the opportunity to more self-pace. My 3rd grader often is having to wait for other classmates to catch up." A student stated, "we like to go at our own pace. No time constraints." One student said they liked the "ability to take more breaks or to push through and do larger portions of work when you want," while another said, "I like that online learning allows you to manage your time yourself and allows you to take breaks if you are starting to fall apart."

Game-based learning. Game-based learning was mentioned often as a successful distance learning engagement strategy. A student said, "I like Kahoot because it is a fun way to learn and I am competitive… the suspense is fun" and another said, "[I like how] it tells you what you got wrong and then it shows you which answer is right." Flipgrid was also a popular tool. Students reported that it "lets you be creative and still get your point across," "allows for real conversation and makes me actually enjoy interacting with my classmates," "making the videos is fun," and "for Spanish… we were able to simulate having conversations one on one like we did when we met in person." Many respondents also mentioned that they liked Google Classroom because it was "easy to find assignments," "simple to use," "everything's in one place," and many respondents mentioned that it helps them stay organized.

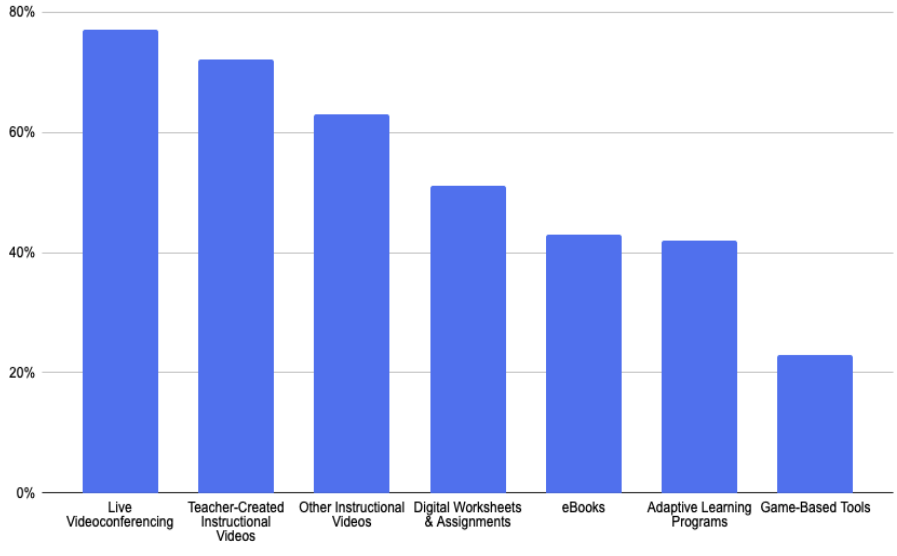

Fig. 2. Successful Instructional Strategies

Unsuccessful Strategies.

Lengthy videos. There were also strategies that participants felt were unsuccessful. Respondents mentioned that when pre-recorded videos were too long, they could not focus, and the video lost their attention. One student said, "if you make a video that is two hours of writing on a whiteboard, when we see the length of the video, we're just going to Google the topic ourselves." Respondents preferred prerecorded videos that were brief, interesting, and interactive. A student stated, "some instructional videos by the teachers are essentially the opposite of interesting YouTube videos, where they are just an hour of a teacher doing problems on a whiteboard."

Classroom management issues and security concerns. Many respondents mentioned that large-group live meetings were challenging, especially with younger students, because many students tried to talk at the same time, and it was challenging to focus on the teacher or speaker. Respondents also reported that there were often technical difficulties during live meetings. One parent stated that "class Zooms have been hard with the age of the kids and technical difficulties," and another said, "it is difficult to corral so many children on Zoom and get them to concentrate on a lesson of any kind." Another parent said that "Zoom was difficult, my daughter has ADHD and it was extremely distracting for her." Many students and parents also mentioned their concerns about security issues with Zoom, and that they felt another live video platform that is more secure should be utilized instead. Referencing Zoom, one respondent said that schools need to "avoid exposing students to programs with many security issues."

Lack of organization and standardization. Another common complaint was a lack of organization and standardization between different classes. One student said, "Can we not just have all of our work in one spot? I have some things assigned via email, some via The Wire, and most via Google Classroom. It's getting really hard to keep up with it and it would be nice if everything could pick a universal method for this so it's less

scattered." Other students said, "don't use 30 other websites that no one [else] has used," and "pick a few and stick with them."

4.3 Research Question 3: What are the challenges faced by students and families related to at-home learning?

Technology access. Respondents were able to select as many of the challenges as they experienced. The majority of the students and parents reported having the technology they needed to participate in distance learning. 94% of the survey respondents reported having high-speed WiFi at home, and 94% also reported having a printer at home. While 95% of respondents reported having enough devices in their home for the people who need them, multiple respondents mentioned purchasing an additional computer or tablet at the beginning of distance learning because they did not have enough devices and sharing was a challenge. 11% of respondents reported that they did *not* have everything they needed to successfully learn online and most reported that they were either lacking WiFi or fast enough WiFi, a printer, the textbooks, or enough devices in the home. 20% of respondents reported that they wished they had better WiFi.

Lack of time. Beyond technology, a common challenge that was mentioned by responding parents was managing multiple children at home who needed help with their work, often while also trying to work from home. Many parents of younger children mentioned that they felt like they had to do too much of the instruction and help too much with assignments. One parent stated, "it can be too overwhelming with multiple children at home… unable to read instructions and [unable] to click to the next assignment and website… independently." Many respondents said that they needed more time to be able to do their job and help their child(ren) with school at home. One parent respondent asked that teachers "be considerate of not only the child's time but the parent's as well. There were a few instances where my kiddo had to quickly turn around an assignment and if I was tied up all day with my work, I wasn't able to devote as much time as she needed to help her through her class work."

Lack of opportunities for socialization. The lack of opportunities to see friends and socialize was another issue according to a large number of the students and parents. A parent stated, "the kids really miss the social aspects of school," and a student said, "I do not like not being able to see my friends and teachers." Many parents and students confirmed that they had similar feelings about the lack of socialization and not getting to see friends as a problem with distance learning.

Screen time. Another difficulty that was mentioned quite a few times in the respondents' comments was screen time and the need for a balance of online and offline activities, particularly for younger students. In one parent's words: "it was ridiculously hard as a Pre-K parent, as we are already told by professionals and teachers to limit screen time, and then all of a sudden they're expected to watch SCHOOL on a computer." An older student said, "I do not like that we are pretty much online all day."

4.4 Research Question 4: What should be done to better educate students in the case of continued online learning or future emergencies?

Increase teacher-guided instruction. The most prevalent theme of the respondent comments about how to improve future distance learning was the need for more instructional videos and teacher-directed instruction. One parent summed up many other comments by saying, "more involvement from teachers to actually teach,

discuss, and review course content (through recorded videos, live instruction, office hours, and some standardized videos). Only the completion of the assignments themselves should fall on the parent." Office hours are times when students can drop in to ask questions, and standardized videos are videos that have been pre-recorded by teachers for students to watch. Another parent said, "there needs to be a human being teaching the info instead of kids reading it and teaching themselves." Other students and parents also mentioned wanting more instructional videos created by the children's teachers. One student said, "we were learning by YouTube more than by a teacher." Many respondents also mentioned that they wanted more small-group live instruction, tutorials, and interactive teaching to be provided. A student said that they disliked how "there is no one on one tutoring for questions," and another said that they would like teachers "to have at least one tutoring session per week."

Intentional workload and assignments. Another common theme, especially among older students, was the need to reduce the workload. Many respondents said that they felt the workload was higher than it was when students were on campus, and that the work mostly consisted of busywork that was not applicable to the real world. A student stated, "It seems like teachers are just giving busy work, not improving my learning skills." Another student said that "there needs to be more awareness of the amount of assignments being given. We have seven classes and the work can be overwhelming." Yet another said they wished that "my teachers could understand that I have other work and that sometimes their demands are way too high." One parent said that they wished there would be "more focus on teaching and less on assignment volume and grades. More social interaction/development [and] connection with the teacher." However, other respondents, generally parents of younger students, said that not enough work was given. One parent of a younger student said, "I like a heavy amount of work – please offer lots of optional activities to better help reinforce learning!"

Improve and streamline communication. Communication was also mentioned by many respondents as an area for improvement. Quite a few respondents said that there could have been better communication or that communication could have been shared in a more organized way, such as all through a single platform. Multiple respondents also mentioned that they would like the teachers to be available more often and respond more quickly if students need help or have questions. One parent said their child's school could "have more communication and consistency… it was incredibly confusing." Many students said that it took a long time to get answers to their questions that they asked over email.

5 Discussion & Recommendations

This study set out to explore the experiences of PreK-12 students who were educated fully online during the sudden move to distance learning due to the COVID-19 pandemic. The study evaluated how students learn online, what strategies and tools are most successful, and what challenges they face related to learning at home. Further, it examined what should be done to better educate students remotely in the case of future emergencies.

5.1 What strategies and tools are being used to teach online during the COVID-19 crisis?

The results indicate that a variety of strategies and tools are being used to educate students at a distance. The most commonly utilized strategies and tools included a Learning Management System (LMS), video conferencing platforms, teacher-created instructional videos, and other online instructional videos. eBooks, adaptive learning programs, digital worksheets and assignments, and communication and discussion platforms were also popular. This showed that teachers generally had at least a foundational understanding of the technology needed to facilitate teaching and learning at a distance.

5.2 What strategies and tools have been most successful? Least successful?

The instructional strategies reported as most successful by the respondents were live videoconferencing, teacher-recorded instructional videos, other instructional videos, and game-based learning. Students and parents value tools that allow students to connect with their teachers and classmates and get the "feel" of a classroom environment. Students miss their teachers and peers, so schools and teachers should make an effort to build community and connection. This recommendation is consistent with previous literature, as many researchers have emphasized the need to intentionally build community in a distance learning environment [21], [34], [39]. Students and parents also appreciate the self-paced nature of many home learning assignments and the ability to pause and re-watch instructional videos. Schools and teachers can take advantage of this by incorporating more student-paced activities. This helps teachers build a student-centered learning environment, which has also been emphasized by many researchers as being an essential component of effective online learning [4], [21], [24].

Some areas for improvement also emerged from the respondents' comments. When creating or assigning recorded videos, teachers should be cognizant of student attention spans and ensure that videos are short and engaging. Live meetings should be kept to a reasonable length and the class should be split into smaller groups when possible for them to be most effective, especially with young students. Teachers and schools should make an effort to streamline course organization and tools used to make things easier on students and families. It has been confirmed in the literature that a course's organization and design play an important role in its effectiveness [4], [21], [22].

5.3 What are the challenges faced by students and families related to at-home learning during the COVID-19 crisis?

While most of the survey respondents had the technology necessary to participate in distance learning, some families indicated that they needed another device, better WiFi, or a printer. One major challenge that was commonly cited by parents of young children was finding the time to do their own work and instruct their children. To help with this, schools and teachers can make an effort to provide more activities that don't require parental assistance, such as tools that students already know how to use, instructional videos that young children can watch independently, and live tutorial sessions that children can participate in. Students missed their peers and wished they had more opportunities to socialize, a challenge that was also noted by Daniel [1]. Teachers and schools can build in opportunities for socialization through live meeting tools as well as asynchronous social learning tools.

5.4 What should be done to better educate students in the case of continued online learning or future emergencies?

Participants had many suggestions for how to better educate students in the case of future distance learning. The need for heightened teaching presence and increased instructor support and feedback was emphasized as important by respondents, confirming online instructor best practices from the literature [21], [22], [34], [39]. Communication was also an important area that students and parents felt should be a focus during online learning, and is something that schools should be intentional with, especially at the K-12 level.

6 Limitations

The majority of the survey respondents came from one private school in the same Texas city; most respondents came from a middle to high socioeconomic status background. Therefore, it is unlikely that this survey is a representative sample of the experiences of all PreK-12 students and parents in the United States. Caution should be exercised when interpreting the findings of this single study, as it may not reflect on the experiences and challenges of a broader demographic.

7 Future Research

As the COVID-19 pandemic continues, many schools continue to offer instruction at a distance. Opportunities for future research include evaluating at the development of fully online learning offered by these schools over time, the most successful approaches to providing distance learning during the pandemic, the impacts of distance learning due to COVID-19 on the overall growing trend of online education, and the long-term impacts of online learning on teachers' technology integration in the classroom. An interesting potential research angle would be evaluating the difference between what was offered in the spring of 2020 and what is offered in the fall of 2020 after schools had more time to prepare and train teachers on distance instructional strategies. Research opportunities abound related to online learning and the use of educational technologies during COVID-19 and will certainly continue to be a significant area of interest for researchers in the field of educational technology.

8 Conclusion

With distance learning taking place in nearly every city and state across the county, it is necessary for schools and teachers to analyze the greatest distance learning experiment in history. Educators need to know what methods have been successful, what challenges are being faced, and how online instruction can be improved upon to better meet the needs of students and families. This study shed light on both successful strategies and areas for improvement, and schools and teachers can use this information to improve their online instruction. It is crucial that the education system address these challenges and make improvements so that students have the opportunity to get a high-quality education whether they are able to be in the school building or are learning remotely from home.

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