UNDERSTANDING THE EFFECTS OF VIRTUAL EDUCATION ON YOUNG CHILDREN AND THE RELATIONSHIPS BETWEEN TEACHERS, PARENTS, AND CHILDREN DURING A GLOBAL PANDEMIC

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Abstract

The global COVID 19 pandemic dramatically altered the early education teaching landscape worldwide. The switch to a virtual education model left many educators, parents, and students scrambling to access appropriate technologies, adjust complex schedules, and attempt to learn in a radically different way. For very young kindergarten-age children, their introduction to formal education via virtual technologies in 2020/2021 has been particularly challenging. To understand more about the inter-related experiences of children, teachers, and parents engaged in kindergarten learning during this challenging time, we conducted a series of online in-depth interviews with the key stakeholders in this endeavor. The goal of our study was to determine how parents and children coped with a virtual education model, how teachers adapted or abandoned teaching practices, and how future virtual learning technologies might best support students, parents, and their teachers in achieving their goals. Our findings describe communication issues, the new (and not always welcome) roles for both teachers and parents as coaches, therapists, and teacher-parent, and emotional familial conflicts about learning and working together during lockdown. We propose four interactive virtual learning interfaces to address some of the issues uncovered and examine their potential implications with invested stakeholders.

Keywords: Covid-19, Kindergartners, Parents, Teachers, Relationships, User Interface.

1   INTRODUCTION

For kindergarteners, one of the key objectives of their experience is to encourage the development of relationships and communication between peers, as well as recognize the authority of another adult beyond their parent(s) or primary caregiver. This entails not only talking with their peers but cultivating meaningful relationships and actively participating in the classroom [1]. Learning experts have long drawn attention to the power of learning *by doing* ([2], [3]), and especially *collaboratively* in social environments [4]. For children of kindergarten age, moving between individual exploration and collaborative engagement is best when encountered in multiple contexts, including in pairs, small cohorts, in the classroom, and at home [5]. Other goals include the students being able to recognize one another's emotions, express concern in times of stress and assist their classmates indicating a sense of connection [6]. In school, kindergarteners have to understand how to cultivate these relationships on their own and initiate this behavior [1]. Being able to develop these skills is critical as this is when children first learn how to interact with other children who are not their family and began to learn the challenge of prioritizing "others" over "themselves".

The COVID-19 pandemic has dramatically altered the ways that humans work, learn, distract, and entertain themselves [7].While the shift in routine towards online interactions is certainly challenging for adults, it also produces additional difficulties for less familiar technology users, including the elderly and young children [8]. Virtual education for university students has been reasonably well explored, particularly in countries with students spread over large distances in geographically complicated environments ([9], [10]). However, this past year, for many children of kindergarten age, their first introduction to semi-formal learning involved navigating video conferencing software that was not designed with this particular consumer in mind [11]. For parents trying to work from home under already challenging conditions, the need to provide technical support for young children in addition to their other responsibilities had the propensity to greatly increase levels of familial stress. Tools such as Zoom or Microsoft Teams are designed for users who can read, recognize the meanings of icons, understand functionality hierarchies (i.e. dropdown menus), and have rudimentary problem solving skills when things go wrong.

To understand more about the challenges for children, parents, and teachers in supporting kindergarten teaching and learning through screen interfaces, we conducted an online interview study with six parents of kindergarten children and four kindergarten teachers, all located in Virginia, USA. As part of the study, we also demonstrated interactive application to the participants that depicted alternative kindergarten virtual learning experiences. Our findings point to issues with the new roles required of parents and teachers alike in this novel distant situation, conflicting relationship dynamics that emerged over the course of lockdown, and some emotional familial problems that surfaced as a result of competing schedules in the combined home work/learning space.

2   METHODOLOGY

We used a three-stage iterative design process as depicted in Figure 1 to accomplish the following: 1) understand some of the current effects of virtual education on young children and the changing relationships between teachers, parents, and children; 2) create a digital prototype of a more child-oriented virtual learning interface; and 3) develop a set of general design recommendations for virtual education tools for very young children. We used a variety of qualitative and quantitative methods in this work including interviews, prototyping, and data analysis [12].
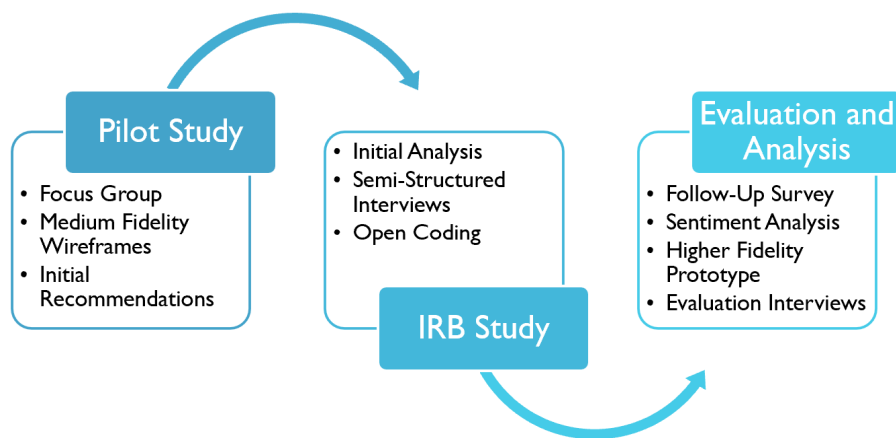

Figure 1. Stages of research

We conducted semi-structured interviews with six parents of kindergarten students and four kindergarten teachers. The interview study protocol was approved by the Institutional Review Board at Virginia Tech. The eligibility requirements for the study were as follows: 1) parent of a child aged between 4 – 6 years old who had received virtual school instruction OR kindergarten teacher who had delivered virtual school instruction 2) be between 18 - 85 years of age; and 3) be proficient in written and spoken English. We identified and recruited subjects by snowball/word of mouth over email. Subjects were recruited from the Fairfax school district in Virginia. Figure 2. presents the demographic information of the study participants.

PID	Role	Age	Children in Kindergarten	Interview Duration	Job
P1	Parent	48	2	30:18 min	Business Consultant
P2	Parent	44	1	43:33 min	Microsoft Developer
P3	Parent	44	2	28:02 min	Photographer
P4	Parent	42	1	34:04 min	Stay at Home
P5	Parent	37	1	29:19 min	2nd Grade Teacher
P6	Parent	34	1	26:16 min	High School Teacher
P7	Teacher	51	1	44:40 min	Kindergarten
P8	Teacher	44	0	28:50 min	Kindergarten
P9	Teacher	45	0	16:06 min	Kindergarten
P10	Teacher	48	0	42:10 min	Kindergarten

Figure 2. Study participant demographics

During the interview, participants were asked a series of questions in a semi-structured interview format. Topics covered included determining morning routines pre-school, work/life balance, relationships between families and teachers, and overall challenges encountered with learning experiences during this difficult time. We also showed the participants medium fidelity wireframes that we created after an initial informal focus group session with parents, teachers, and graduate students at our home institution. The interviews were conducted over Zoom, recorded with permission, and then automatically transcribed. We analysed the transcripts using a process of open coding, working together in labelling two of the transcripts [13]. Following discussions, we developed a list of codes that were used to label the remainder of the transcripts [14]. The research team worked together to categorize the codes into primary themes. The six primary identified themes are presented in Figure 3.
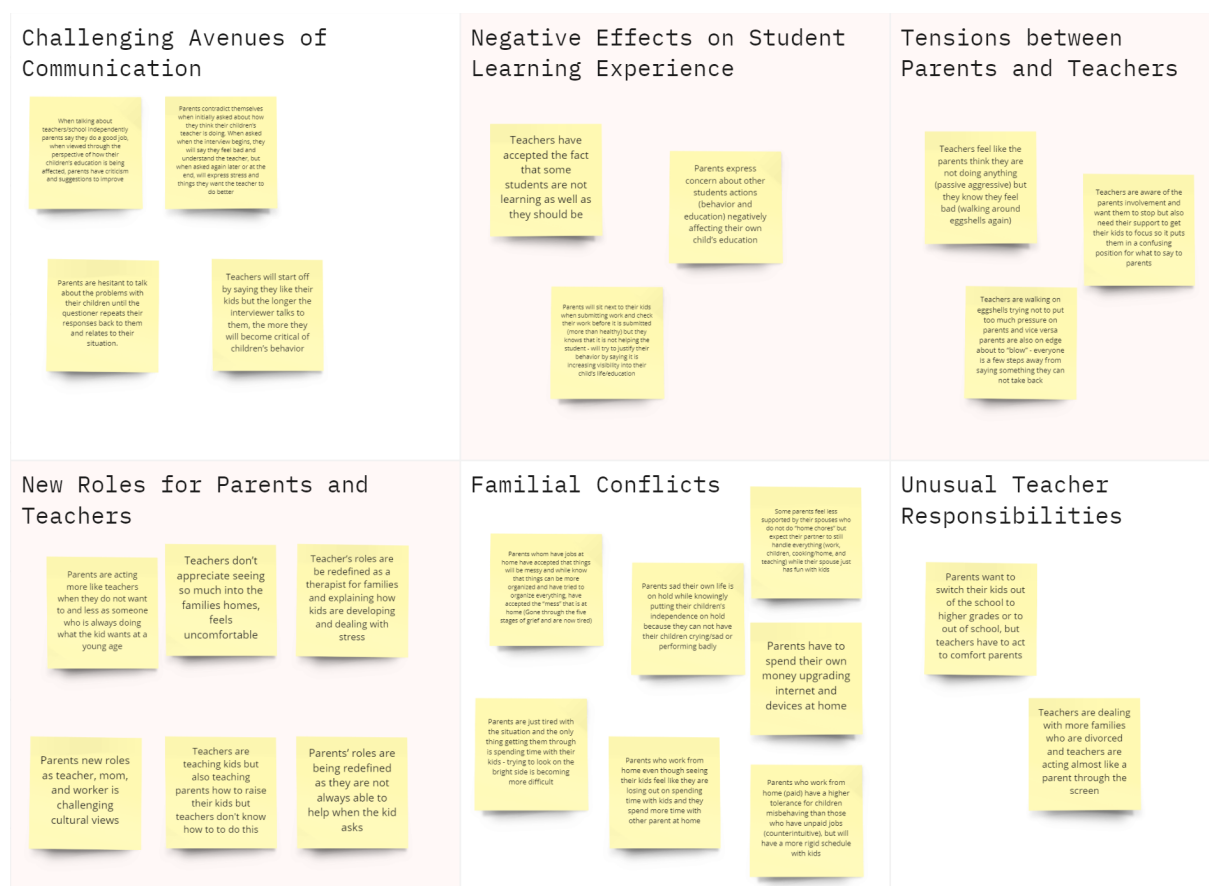

Figure 3. Six primary themes and clustered examples

3 STUDY RESULTS

3.1 Negative effects on student learning experience

The parents in our study reported two primary issues with their kindergarten children's experience with online learning. The first concern was that expressed misgivings about how other student's actions in the virtual classroom were negatively affecting their own child's education and how interactions with their teachers involved some levels of misunderstanding. A common concern from parents about other students was that they were talking over their child and they believed that their child's voice was not being heard. Teachers noted issues with trying to selectively mute students, so to keep things under control, they tended to mute everyone. This sometimes had a negative effect as noted by P2: *"Kindergarteners sometimes will cry off the camera, because there is no way like if the teachers accidentally mute the mics",* P2. From a different visual perspective, P4 also noted her child's frustration for example: *"My kindergartener will hold up her work, but nobody sees her. And she, in the beginning, didn't realize that no one could see her. And she kept waiting and waiting for someone to say something. But I mean, the teachers have no idea."*

A second concern noted and remarked on by parents and teachers alike related to the amount of assistance/help offered by parents who were now sitting alongside or near their children in the home. The parents justified their desire to assist their children (and to be seen as assisting), as noted by P4: *"But just to double-check that they're submitting it right, they sometimes have trouble. So because I double-check before submitting [increases my] visibility."* Parents noted that because they could now effectively listen in on activities in school, they were more aware of their child's experience. Parents displayed varying reactions to this, ranging from frustration at hybrid communication modalities, to feeling overwhelmed by the amount of parent/teacher communication. For example, with the former, P5 stated: *"Sure she's swamped. But I mean, some of those questions don't always get answered. So I feel like it gets missed. And then you know, she might send out a, he might address it in another form, like a few days later, it's not to me."* Another parent expressed interest in getting summary details about their child's daily experience: *"Just a summary. So I didn't have to worry about going through, you know, 20, or however many emails."*

3.2   New Roles for Parents and Teachers

It became apparent during our interviews that parents and teachers are being forced into new roles that they do not necessarily have the training for or do not know how to complete, resulting in stress. The first is that parents are being forced into the role of being a teacher. This is in large part due to asynchronous days in which teachers just give work for students to do at home without having class. *"I'm like almost prepared, like, okay, Mondays, I gotta like watch over them. So yeah, it's certainly a source of stress."* Parents on these days have to push their children to do work, but because the direction is coming from their parents, children rebel more owing to the parent/child dynamic. *"If the teacher asked her to do something she didn't want to do, she would just do it. But because I'm her mom, you get more pushback."* On days when there is synchronous learning, parents have to stop what they are doing to assist the teacher in getting their child to focus and pay attention if their child does not want t, which takes time away from their own lives, blurring the lines between school and home. *"And we can only prep them so much all the time. I mean, there are days where we're busy, and they don't, they don't always have they have everything."*

From the teachers perspective, several noted that they were acting more like therapists for parents and less as teachers for their children. Teachers expressed frustration about having to have long virtual conversations with parents about how they should be raising their children, which they felt was placing a burden on them to direct the parents on how they should act with their children, particularly with regards to teaching certain assignments on asynchronous days. *"The mom can't be sitting next to her for the rest of her life, holding her hand making sure to pay attention in class. Right? Like she's got to develop those skills on her own."*

3.3   Tensions between Parents and Teachers

During the interviews, the teachers described growing tensions with parents over the course of the pandemic. The believed that some of the parents gave the impression that they thought the teachers weren't doing enough, but weren't coming out directly and saying that. P7 described how they thought there were misunderstandings between parents and teachers because: *"And people [Parents] like can misread your tone and stuff like that."* While acknowledging the stresses everyone was going through, the teachers described the tensions between trying to support the children with independent learning, but also helping the parents to support their children. This issues was noted by P10 who stated: "So some of the work isn't as authentic on their own, because the parents are like, spelling everything for them, or they're just not independent." Several of the parents acknowledged this directly, with P4 saying: *"I double-check all their work."*

In response, the virtual education platform could be improved by making accounts for parents and incorporating them into the classroom environment. Every week, if the parent chooses to, one parent could lead a book reading or a virtual activity in their online module for the class. The purpose of this would be to show the amount of work that goes into handling 20 to 30 students virtually. This would be different than the teacher just describing the work because many times parents might not understand until they experience the pressures that teachers experience. Another tool that the prototype could have is to generate a transcript of the class and at the end of the day it would get sent to the parents so they would have a direct and more convenient report of what happened in class. This would also support the teachers in their efforts to explain to parents what they are doing every day and why their increased 1:1 conversation with their children might not be as easy as it seems.

3.4   Familial Conflicts

The interviews surfaced several interpersonal family conflict situations that may be beyond the abilities for a technology to solve. Parents who were working full-time outside of the house before the pandemic seemed more accepting about the fact that things would get messy with everyone being at home and that organizing efforts might not always work out. They also described a higher level of tolerance with regards to children 'acting out' at home, as opposed to parents who worked in or from the home prior to lockdown. Issues of productivity and/or unfair distribution of workloads were also described. P5 described how everyone was really losing out as: *"Then certain aspect is a lot of frustration, because I can't get anything done, and they're not growing."* P1 drew attention to tensions within their family in terms of balancing work commitments, supporting children's learning, and fun times: *"I see mommy, but she is practically useless to me. Because she's in her work, and she cannot drop her meetings and come help over with my technical issues, or schoolwork issues… So I think they are getting more attached to daddy because he has energy and time."* Finally, the last major conflict at home is the increased cost associated with parents having to spend their own money upgrading internet and devices at home to accommodate for the increased throughput. *"We had to upgrade our wi-fi as well. And the last category I would say is the software school software, it's not easy or intuitive to use."*

3.5   Unusual Teacher Responsibilities

Similar to being defined in new roles, the teachers in our study also described having to take on some unusual responsibilities, which they did not necessarily feel well equipped to deal with. Some parents proposed putting their children in higher grades or even taking their children out of school altogether as possible solutions to issues noted by the teacher. This lead to challenging conversations, where teachers felt the need to explain why that might not fix behavioral issues in and of itself. 3 of teachers described the challenges with dealing with families in non-nuclear units, such as when parents are divorced and not necessarily communicating well and/or having different rules in each house. *"I have to not only educate children but also their parents about how to raise their kids and deal with their estranged partners. I am not trained for this."*

3.6   Challenging Avenues of Communication

The final finding from our interviews reveals the ambivalent and/or contradictory ways that our participants described their reflections on the virtual learning experience. As the interview questions progressed from the general to the specific, there was a tendency for the participants to become more pointed in their criticisms of the parent/teacher/child dynamic. With the parents, they mostly initially expressed initial support for the activities of the teacher and their school district overall, but when discussing their own child's experience, this changed somewhat. While they acknowledged at first that they felt bad for the teacher's situation, in later stages of the interviews, the parents noted that they thought to teacher could do better: Early in interview: *"Teachers are doing a great job";* Later in interview: *"Teachers are not hearing our concerns and our children are suffering,"* (P2).

From the teacher's perspective, we noted a similar change over time in how the teachers in our study described their students. While initially highly supportive, they began to more sharply describe their opinions on the children's (mis)behavior over time, starting from *"Just spending time with students is great",* to later stating – *"children's behavior can wear our patience thin more-so than when we interacted with them in person",* (P3).This contradiction could be explained in that the parents/teachers might not have had a chance to discuss this experience with an "outsider", so after developing some level of trust, the participants felt comfortable in more pointedly describing their feelings.

4   VIRTUAL LEARNING PROTOTYPE

In response to the interviews, we developed four interactive interface prototypes depicting potential solutions to the problems encountered by the teachers, children, and parents in our study. We recognize that several of the emergent themes cannot be solved by a technological intervention alone, but rather require thoughtful and constructive discussion and/or compromise. We presented the four virtual learning interfaces as interactive walkthroughs to eight participants to gather their impressions.

4.1   Rethinking breakout rooms

Teachers and parents acknowledged that there were issues using tools such as Zoom in controlling and monitoring children, particularly in breakout rooms when the teacher could not always be present. These

rooms also created stressors on the children in that they would sometimes get frustrated if they felt that they weren't receiving enough attention from either their peers and/or the teacher. This lack of visibility directly relates to the issues described in 3.1 about negative effects on children's learning. In response, we propose a revised interface as depicted in Figure 4, which visually more closely resembles a classroom environment. Here, instead of separate rooms, we use the metaphor of tables, where the students (represented as small circles) can be assigned. The students would hear only the other students at their table but they would be able to still see everyone else in the classroom. If the students wanted to move between the tables they could possibly click on another table, but to maintain control, the teacher could choose to allow or prevent students from moving after their initial table selection/assignment.
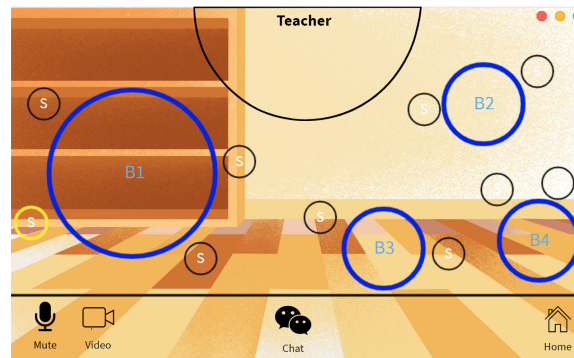

Figure 4. Breakout room video, with four tables

When evaluating this final design, parents and teachers appreciated the increased visibility that the students and teachers would have of the classroom and felt that it would increase their sense of being listened to and observed. The teachers also appreciated the level of control that they could have over the movement of the children as they would want to shift that level based on the activity the class might be engaged in.

4.2 Free time view

The parents in our interviews described the stay-home asynchronous days as being particularly challenging, when they were charged with supervising the completion of small projects and tasks in the absence of the teacher. The tensions revealed between teachers and parents (in sections 3.1 and 3.2) around "helicopter" supervision by parents also prompted us to consider overt opportunities for children to learn and socialize independently. To decrease the burden on parents and to enable children to have an opportunity to demonstrate independence, confidence, and responsibility, we propose a "free time" interface as depicted in Figure 5.
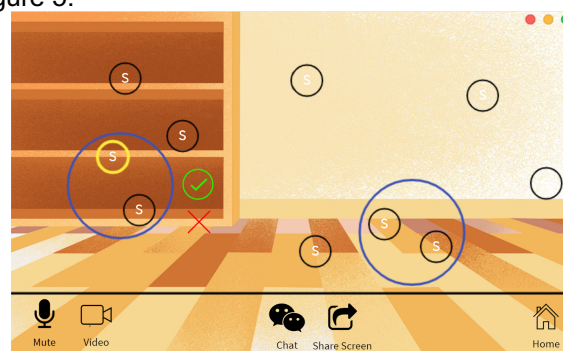

Figure 5. Breakout room video, with four tables

In this interface, students could independently move their "circles" around the screen. If they wanted to talk to a fellow student, they could click on that student and a navy "bubble" would appear around them indicating that they were in a group. During this time, they would they be able to hear one another, while also being able to see the rest of the active students in the class. If another student wanted to join their bubble, then they could click on the group and an option would appear for the students already in the group to admit this student or not. Students could then choose to expand their conversation bubble. Students could also leave the bubble at any time. The parents who viewed this interface appreciated the freedom that students might have in this new format as it would relieve the pressure on parents to

"entertain" the students on asynchronous days and would also provide teachers with a new way to have virtual recess. However, both teachers and parents expressed concerns about moderation and as a compromise, suggested that free time sessions should be knowingly recorded in case of any unpleasant incidents.

4.3 Teacher view

The teachers in our study described their frustration at the difficulty navigating the muting and unmuting features in Zoom, and the confusion this also caused with students who didn't understand why no-one was listening to or engaging them. We proposed an alternate interface, depicted in Figure 6 which would give the teacher easier access to the muting functionality and increase the visibility of the feature for the students. Teachers would have the option of muting everyone, unmuting everyone or selecting individual students or tables of students to mute and unmute. The functionality would be accessed by simply selecting a student 'circle' to mute them, resulting in a red bar appearing over their circle letting everyone see who had or had not permission to talk.
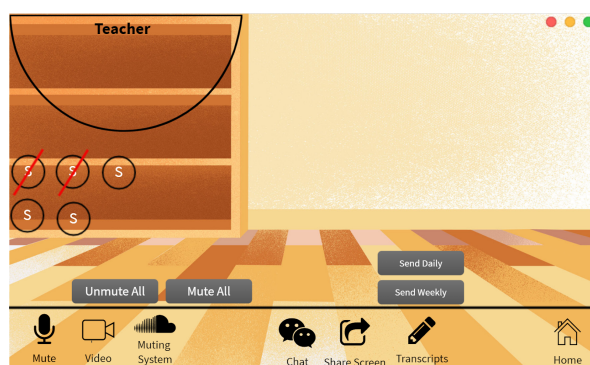

Figure 6. Teacher muting view

The teachers described their appreciation for the feature because it decreased the number of steps that they typically had to take to mute either everyone or particular students during noisy classroom times. Parents also felt that it would provide their children with a clearer and more visible way for them to understand whose turn it was to talk in the classroom.

4.4 Bathroom break

Several of the teachers in our study noted that when children at home needed to use the bathroom, they tended to interrupt the class to request this, which could be disruptive. In response, we proposed the introduction of a simple bathroom button which the student could select, thus turning off their video and audio while also sending a notification to the teacher about their status. This way the teacher is notified when the student leaves without disrupting the flow of the class. The teachers in our study appreciated this proposed feature as it would greatly help them control flow of the class. Parents also appreciated that the video turned off automatically when the student walked away, because it could increase the family's sense of privacy in their own home.

5 CONCLUSION

The findings from our work surface challenges and opportunities for improving the experiences of young children, parents, and teachers engaged in virtual kindergarten education. While some of the complex relationship dynamics discussed (between parents, and some between parents and teachers) clearly require interpersonal communications and activities to resolve, we believe that even minor technological adjustments of virtual learning environments could help reduce incidental stressors that can contribute to broader tensions. Deeper consideration of the learning requirements of young children (both in and outside the classroom) could help software developers refine their one-size-fits-all approach to audiovisual communication between consumers of varying abilities, ages, and contexts. Simplifying functionalities, using familiar visual metaphors, and supporting the developing individual and social needs of early learners could better support young children in virtual learning contexts. These approaches further could also generalize into other learning areas, serving to create a more sustainable approach for all distant learners, temporarily incapacitated students, and those impacted by catastrophic weather events.

ACKNOWLEDGEMENTS

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