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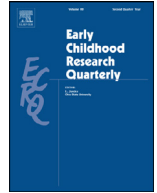
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Early childhood educators' provision of remote learning during COVID-19

Elizabeth A. Steed^{a,*}, Nancy Leech^b, Ngoc Phan^b, Eric Benzel^b

^a Early Childhood Education, University of Colorado Denver, 1380 Lawrence Street Center, Suite 627, Denver, Colorado 80217

^b Research and Evaluation Methods, University of Colorado Denver, 1380 Lawrence Street Center, Suite 627, Denver, Colorado 80217

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ABSTRACT

This study utilized a nationally distributed survey to explore early childhood teachers' experience of providing remote learning to young children and their families during the early months of the U.S. response to the COVID-19 pandemic. A convergent parallel mixed-methods design was used to analyze 805 participants' responses to closed and open-ended survey questions. Results indicated that teachers provided various remote learning activities and spent more time planning instruction and communicating with families than providing instruction directly to children. Early childhood teachers reported several positive aspects of remote learning and various challenges during the initial months of the pandemic. Study findings are discussed in the context of policy and practical implications for supporting early childhood teachers to deliver high-quality and developmentally appropriate remote learning for all young children and their families.

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The coronavirus disease 2019 (COVID-19) was declared a worldwide pandemic on March 11, 2020, a national emergency was declared in the U.S. on March 13, 2020. Following these announcements, schools and child care centers began to close across 48 states in the U.S., the four U.S. territories, and the Department of Defense Education Activity (DoDEA). Many early childhood centers moved from in-person instruction to remote learning. Approximately 58% of early childhood centers in Texas, for example, delivered remote instruction to young children from birth through age 5 during the spring of 2020 (Crawford et al., 2021). Remote learning was most common in school-based early childhood settings; a small number of child care centers remained open, often to serve the children of essential workers (Tarrant & Nagasawa, 2020).

1. Recommendations for remote learning

With the large numbers of children learning at home, the U.S. Department of Education and state departments of education released documents or developed web pages with recommendations for providing continuous learning programs and other forms of support to children and families. Recommendations included: (a) using remote learning where possible, (b) attending to equity issues by providing non-digital learning options, (c) bypassing state

standardized assessments normally given in the spring, (d) balancing instructional needs with students' needs for food and mental health support, and (e) making adjustments for students with disabilities and students learning English (Reich et al., 2020).

The recommendations released by the federal government, states, and districts provided varying degrees of specificity regarding how to provide remote learning to young children under the age of 6. In one example of a state with guidance specifically for early childhood teachers, a task force for the Kansas State Department of Education (2020) recommended weekly calls or video chats with children, establishing office hours for communication with families, providing resources for parents or siblings to support young children's learning, delivering weekly kits of materials, helping families set up a schedule and routine for learning and play, and encouraging reading with children. Recommendations from the state of Illinois for early childhood teachers focused on play-based family learning rather than mastering skills (Illinois State Board of Education, 2020). Most states provided general suggestions for how to approach remote learning for students in preschool through 12th grade, with no specific recommendations for early childhood teachers. Given the lack of clear guidance, it may have been challenging for early childhood teachers to shift from their in-person teaching approach to teaching infants, toddlers, and preschoolers remotely.

* Corresponding author.

E-mail address: elizabeth.steed@ucdenver.edu (E.A. Steed).

1.1. COVID-19 and early childhood educators

An additional challenge for early educators shifting to remote learning may have been their possible discomfort in using technology for the instruction of young children (Judge, Puckett, & Bell, 2006; Myrttil et al., 2018). Teachers of infants, toddlers, and preschoolers tend to infrequently use technology for instruction, relying instead on teaching through play and small and large group instruction (Edwards, 2016). Early childhood teachers are guided by National Association for the Education of Young Children (NAEYC) professional standards of developmentally appropriate practice (DAP) that reinforce the importance of hands-on and play-based interactions (NAEYC, 2020). Further, the American Academy of Pediatrics (AAP) recommends that children younger than 18 months did not have any screen time and that toddlers and preschoolers should have less than an hour a day of screen time (Council on Communications and Media, 2016). Early childhood teachers may worry that incorporating technology into their instruction will increase their students' overall screen time beyond healthy limits, given children's technology use at home (Mertala, 2019). There is a growing number of early childhood teachers who are comfortable with technology and have increased their use of devices such as tablet computers in their classrooms; however, they tend to use technology much less in their teaching than their K-12 counterparts (Myrttil et al., 2018). A 2018 national survey indicated that 24% of early childhood teachers working with infants used computers once a month compared to 53% of those working with preschoolers and 82% of educators working with early elementary students (Pila, Blackwell, Lauricella, & Wartella, 2019). Early childhood teachers tend to use devices for such things as documentation, communicating with families, and playing videos rather than for instruction (Pila et al., 2019). It is well documented that early childhood educators have been provided with few training opportunities in using technology for instruction (Brown, Englehardt, & Mathers, 2016). Pre-pandemic, early childhood teachers' use of virtual, distance or remote teaching was rare.

The shift to remote instruction for early childhood teachers whose early childhood programs closed in the spring of 2020 was abrupt and occurred, for many, without preparation or plans in place for how to provide ongoing instruction to young children (Jalongo, 2021). Early childhood educators may not have had the devices needed to teach remotely, especially in their homes where they were providing remote instruction during a shelter in place orders (Bassok et al., 2020). There are limited data-based studies about how early childhood educators used remote learning during the COVID-19 pandemic. Initial research has focused on challenges, such as low levels of young children's participation in remote learning and a lack of knowledge and skills to carry out remote learning (Ford, Kwon, & Tsotsoros, 2021). Early childhood teachers struggled with an increased workload and changes in home routines (Jeffrey, 2020). This research study sought to extend emergent COVID-19 research by exploring the types of remote learning early childhood teachers provided in the initial months of the pandemic, how their approach varied based on the age of children and program type, the training they received, and the positive and challenging aspects of providing remote learning.

1.2. Current study

The current study utilized a national survey to explore early childhood teachers' experience of providing remote learning to young children and their families in the U.S. in the spring of 2020. This exploratory mixed-methods study was part of a larger project surveying various types of early childhood personnel about how they provided instruction to young children with and without dis-

abilities during many states' shelter-in-place orders due to COVID-19. Specific areas of interest regarding how early childhood teachers provided remote learning during school closures, spent their time across remote learning activities, engaged in training, and described the positive and challenging aspects of providing remote learning to young children. Analyses were conducted on whether different types of remote learning varied depending on the age of children and the program type.

Much of the literature on the types of remote learning provided during the pandemic has focused on older students or families' perspectives. This study contributes to the literature by documenting the remote activities early childhood teachers provided to young children under the age of six and their families and detailing if the activities varied depending on the age of the child (e.g., infants vs preschoolers) or the type of program (e.g., Head Start vs private child care). Reporting how early childhood teachers provided remote learning, time spent on various activities, what went well, and what was challenging contributes to the emerging pandemic research by informing how early childhood teachers might be supported to use digital technology when in-person learning is not possible for young children, such as during school closures due to a pandemic or a natural disaster.

1.3. Research questions

Four research questions guided the study focused on early childhood teachers' experiences of providing remote learning during the early months of the U.S.' response to the COVID-19 pandemic:

- 1 How did early childhood teachers provide remote learning to young children and their families during COVID-19? How well does the age/grade of children served and type of program predict providing different services for children?
- 2 How did early childhood teachers spend their time on remote learning activities during COVID-19? Is there a statistically significant association between time spent in online instruction and time spent planning and partnering with families?
- 3 What training did early childhood teachers receive during COVID-19?
- 4 What were the perceived positive aspects and challenges of providing remote instruction to young children during COVID-19?

2. Methods

A nationally distributed survey was used to explore early childhood teachers' experience of providing remote learning to young children during the pandemic.

2.1. Instrument

A 44-item question survey was developed to canvass the experiences of American early childhood providers who were providing remote learning to young children in the spring of 2020. Following the first item to obtain consent to participate in the survey, the next two survey items asked providers to identify if (a) their program or school was closed and (b) they were providing fully remote instruction and supports to families at the time of the survey; a yes response to both questions allowed continued completion of the survey, while a no response to either question ended the survey. The remaining survey items included 14 questions about early childhood professionals' demographics and the characteristics of their program or school. There were 24 questions about the services and supports early childhood teachers, early childhood special educators, and related service personnel were

Table 1
Sociodemographic characteristics of participants in subsample.

Characteristic	n	%
Race		
Asian	9	1.08
Black or African American	144	17.24
Latinx	54	6.47
White	580	69.54
Other	12	1.44
Prefer Not to Answer	35	4.20
Gender		
Female	781	97.26
Male	11	1.37
Nonbinary	1	0.12
Prefer Not to Answer	10	1.25

Note. N = 805.

provided to children with and without disabilities and their families. For this manuscript, responses to background information and seven survey items (5 closed-ended and 2 open-ended questions) were analyzed; these 7 items focused on the remote services early childhood educators provided to children and families, time allocated across remote learning activities, training for teachers, and what went well and what was challenging. Survey questions not analyzed for this study pertained to remote instruction provided to young children with disabilities. The full text of the survey questions used in analyses is included in Table S1 in the supplemental materials available online.

2.1.1. Survey development and distribution

The first author developed the survey. Prior to distribution to early childhood personnel, researchers piloted the survey with three individuals with expertise in early childhood education, including an administrator who was overseeing remote instruction for a closed early childhood program. Feedback, such as adding a response option about teachers facilitating small group instruction, was incorporated into a final survey. The researchers distributed the survey online via Qualtrics between April 13, 2020, and April 25, 2020 to early childhood professionals nationally. The researchers used snowball sampling, first sending the survey link to the early educators in their email and social media networks (e.g., Facebook). Early childhood educators were asked to send the survey to other teachers in their schools or programs. The researchers contacted administrators and higher education faculty in early childhood education and asked them to send the survey link to early childhood educators in their schools, programs, or to post the survey link on educator listservs. In total, 1583 surveys were completed.

2.2. Participants

For this study, a subsample of the larger national sample was analyzed using a filter to include those respondents with completed surveys and who indicated they were a lead early childhood teacher, resulting in a total of 805 survey responses across 28 states. Participants represented the Northeast, Southwest, Southeast, Midwest, and West; however, there were more participants from the Southeast and West. Self-reported race and gender of participants are shown in Table 1. Participants had worked in their field an average of 12.23 years ($SD = 8.06$) and had worked in their position an average of 5.96 years ($SD = 5.79$). Program characteristics reported by participants included community type (i.e., rural, suburban, urban), program type, length of the school day, and age/grade of children in the teachers' classroom are shown in Table 2. The authors obtained IRB approval through their university. All participants consented to participate in the study at the start of the survey; participants did not receive compensation.

Table 2
Program characteristics of participants in subsample.

Characteristic	n	%
Community Type		
Rural	229	28.52
Suburban	303	37.73
Urban	246	30.64
Other	25	3.11
Type of Program		
Head start	64	7.28
Private	78	8.87
Parochial or religious	6	0.68
State funded pre-K	679	77.25
Other	34	3.87
How long children attend each day		
Partial day (e.g., morning only or afternoon only)	62	7.52
A full school day (e.g., 8 AM – 2:30 PM)	665	80.70
A full work day (e.g., 8 AM – 5 PM or later)	61	7.40
Other	36	4.37
Age/grade of children in teachers' classroom		
Infants (children under 2 Yr of age)	20	2.28
Toddlers (2 – 3 Yr old)	33	3.77
Preschoolers (3-4 Yr old)	92	10.50
Pre-K (4 – 5 Yr olds)	707	80.71
Kindergarteners	11	1.26
Multiple ages/grades	6	0.68

Note. N = 805.

2.3. Data Analysis

A convergent parallel mixed methods design (Creswell, Plano Clark, Gutmann, & Hanson, 2003) was used to analyze 805 early childhood teachers' responses to closed and open-ended survey questions. The study was conceptualized as a mixed-methods study from the formulation stage through data collection, analysis, and interpretation of the results (Onwuegbuzie & Leech, 2005). Mixed methods were chosen in order to use different and complementary methods to investigate how early childhood teachers provided remote learning. Specifically, open-ended survey items were used to allow participants to explain their experiences, adding context and elaboration beyond responses to closed-ended questions. In terms of the timing of data analyses, quantitative and qualitative analyses of responses to select closed and open-ended survey questions were conducted individually and at the same time.

Closed-ended quantitative survey questions were analyzed using descriptive statistics, correlations, weighted chi-square tests of association for hypotheses, and logistic regression. Assumptions for Pearson correlation including the linear relationship between the two variables and scores being normally distributed were checked and met. Predictor variables were coded as 0 or 1, with 1 indicating the presence of the variable. Assumptions of logistic regression, including observations being independent and independent variables, must be linearly related to the logit of the dependent variable, were checked and met. Odds ratios (OR) were checked to assess the ratio of the probability of the occurrence of the outcome variable based on the predictor variable. OR are interpreted as follows: an OR equal to 1 indicates the predictor variable does not affect the odds of the dependent variable being true, and OR greater than 1 indicates the predictor variable is associated with higher odds of the dependent variable being true, and OR less than 1 indicates the predictor variable is associated with lower odds of the outcome being true. OR are only interpreted when they are statistically significant. A Bonferroni adjustment was utilized for the alpha value for all statistically significant findings to account for the large number of total analyses conducted, thus an alpha level of 0.002 was used to identify statistically significant findings. For

Table 3
Summary of the number and percentage of participant statements by theme and sub-theme.

Theme	Positive aspects	Challenging aspects
Children's Learning	Remote learning going well (<i>n</i> = 166, 24%)	Difficult to teach children remotely (<i>n</i> = 178, 21%)
Family Partnerships	Children participating in and enjoying lessons (<i>n</i> = 82, 12%) Family participation and communication (<i>n</i> = 259, 38%) Families' appreciate remote learning (<i>n</i> = 97, 14%)	Some families not able to support remote learning (<i>n</i> = 276, 33%)
Technology	Able to stay connected when apart (<i>n</i> = 48, 7%)	Technology issues for teachers and families (<i>n</i> = 83, 10%) Learned remote technologies quickly (<i>n</i> = 187, 22%)
Emotions	Sense of community (<i>n</i> = 27, 4%)	Work-life balance (<i>n</i> = 66, 8%) Emotional toll from pandemic, workload, and loss of contact with children and families (<i>n</i> = 47, 6%)

Note. There was a total of 679 participant statements for Q40 (positive aspects) and a total of 837 participant statements for Q42 (challenges).

the seven survey items where “other” was an option, the responses were reviewed but not included in analyses.

For qualitative analyses, a phenomenological approach (van Manen, 1997) was used to understand early childhood teachers' experiences of what went well and what was challenging about providing remote learning. A 6-phase process of thematic analysis (Braun & Clarke, 2006) was utilized to code responses to two open-ended survey questions, Q40 (What went well?) and Q42 (What was challenging?). Participant statements, phrases, and sentences that described a cohesive concept or experience, were identified as the unit of analysis. The first two phases of thematic analysis involved an initial review of participant statements and an open coding process (Corbin & Strauss, 2008) leading to preliminary emergent codes and initial categories for further analysis. In phases three and four of the process, initial codes and categories were reviewed and combined, resulting in four overall themes and 12 sub-themes.

Next, during phase 5, all participant responses were coded to achieve a frequency of statements associated with each sub-theme. The number and percentage of statements associated with each sub-theme are reported in Table 3. Five hundred forty-three participants responded to Q40 and 458 responded to Q42. The total number of statements that aligned with each sub-theme (679 for Q40 and 837 for Q42) is higher than the number of participant responses for each open-ended survey item given that it was possible for one participant's response to include multiple statements, the units of analysis. In the sixth phase of thematic analysis, example participant quotes were selected for each sub-theme. A full description of all steps carried out during the 6-phase thematic analysis process is included in Table S2 in the supplemental materials available online.

2.4. Trustworthiness

The research team used several strategies to promote the credibility, transferability, confirmability, and dependability of the findings, especially for the qualitative analysis of participant responses to open-ended questions (Lincoln & Guba, 1985). Researchers piloted the survey prior to distribution, created a comprehensive audit trail for all coding and analysis, conducted interrater reliability for emergent sub-themes, and utilized member checking (White, Oelke, & Friesen, 2012). For interrater reliability, a second researcher independently coded the first 10% of responses for each question (*n* = 84 and 86), which is a typical amount to be coded for interrater reliability (O'Connor & Joffe, 2020). Interrater reliability was calculated using both percent agreement and Cohen's kappa (Gisev, Bell, & Chen, 2013). Percent agreement for coding ranged from 88% to 100% (*M* = 95%, *SD* = 4.01). Kappa values ranged from 0.62 to 1.00 (*M* = 0.79, *SD* = 0.13). Member checking was done through online individual interviews with a sample of participating early childhood teachers. The first author interviewed 6 participants over Zoom, sharing key findings with the

teachers and asking for their input. All participants confirmed that the findings were accurate and provided additional details about the remote services they provided, examples of struggles they had to communicate and engage with families, and descriptions of the challenges managing their workload and personal life. Findings from member checking confirmed the combination of qualitative categories during the thematic analysis process, such as the combination of codes related to challenges communicating with families and the challenge of engaging some families in remote learning.

3. Results

3.1. RQ #1: How did early childhood teachers provide remote learning to young children and their families during COVID-19? How well does the age/grade of children served and type of program predict providing different services for children?

3.1.1. Instructional activities

Participating early childhood educators (*n* = 805) reported the most frequent types of synchronous remote learning provided to young children. Participants could choose multiple response options for this survey item, resulting in a total of 1058 responses. The most frequently provided synchronous remote learning activities were singing songs or reading a story online with children (*n* = 478, 71.24%), online lessons using a learning system such as Google Classroom or Schoology (*n* = 466, 69.45%), online class meetings (*n* = 371, 55.29%), individual meetings with children (*n* = 205, 30.55%), and organizing small groups of children for social activities online (*n* = 202, 30.10%). Three-hundred eighty-seven (37%) participants reported they did not use any instructional activities; 170 (16%) reported providing one activity, 145 (14%) reported two activities, 137 (13%) reported 3 activities, 116 (11%) reported 4 activities, 90 (9%) reported 5 activities, and only 13 (1%) reported 6 activities.

Teachers reported providing different services for children based on the age/grade of children served and type of program (i.e., state-funded pre-K, Head Start, private, or parochial/religious) analyzed with logistic regression. When all predictors were considered together, all but using online breakout sessions for small group instructions and how to deliver telehealth services were statistically significant. Due to smaller than typical effect sizes, further analyses were not conducted.

3.1.2. Family-directed remote learning activities

From a multiple response option survey item with 1031 total responses, descriptive statistics revealed early childhood teachers reported that they involved families in remote learning in various ways, including sharing learning activities that families could do at home (*n* = 654, 97.47%), checking in with families (*n* = 606, 90.31%), sending families links to online resources (*n* = 566, 84.35%), and giving families suggestions to support parent-child

relationships ($n = 507, 75.56\%$). The program supports provided to families included delivering food, diapers, or formula to families ($n = 295, 43.96\%$) and sharing community resources, such as domestic violence shelters or food banks ($n = 290, 43.22\%$). Some teachers reported not involving families in remote learning ($n = 387, 37\%$); 31 (3%) reported providing one supportive service, 28 (3%) reported providing 2 services, 83 (8%) reported providing 3 services, 185 (18%) reported providing 4 services, 181 (17%) reported providing 5 services, and 136 (13%) reported providing 6 services.

Utilizing logistic regression, teachers reported different services for families provided by the program based on the age/grade of children served or type of program (i.e., state funded pre-K, Head Start, private or parochial/religious). When all predictors were considered together, they significantly predicted sharing learning activities that families could do at home ($\chi^2 = 532.66, df = 9, n = 1058, P < 0.001, Nagelkerke R^2 = 0.54$); giving families suggestions to support parent-child relationships ($\chi^2 = 337.87, df = 9, n = 1058, P < 0.001, Nagelkerke R^2 = 0.37$); arranging family competitions, like bake-offs, legos, or crafts ($\chi^2 = 22.97, df = 9, n = 1058, P = 0.006, Nagelkerke R^2 = 0.08$); sending families links to online resources ($\chi^2 = 386.83, df = 9, n = 1058, P < 0.001, Nagelkerke R^2 = 0.41$); delivering food, diapers, or formula to families ($\chi^2 = 200.33, df = 9, n = 1058, P < 0.001, Nagelkerke R^2 = 0.25$); sharing community resources, such as domestic violence shelters or food banks ($\chi^2 = 186.02, df = 9, n = 1058, P < 0.001, Nagelkerke R^2 = 0.23$); and checking in with families ($\chi^2 = 462.80, df = 9, n = 1058, P < 0.001, Nagelkerke R^2 = 0.48$).

Table 4 presents the betas, standard errors, odds ratios, and P values. Examination of the odds ratios revealed teachers who taught infants, preschoolers, or pre-K and were in state-funded pre-K, Head Start, or a private school were statistically significantly more likely to (a) share learning activities that families could do at home; (b) give families suggestions to support parent-child relationships; (c) check-in with families. Teachers of infants, preschoolers, or pre-K, who were in a Head Start program or a private school were statistically significantly more likely to send families links to online resources. Teachers who taught pre-K in state-funded pre-K programs or Head Start were more likely to deliver food, diapers, or formula to families. Finally, teachers who taught infants, preschoolers, or pre-K and were in a Head Start were more likely to share community resources.

3.2. RQ#2: How did early childhood teachers spend their time on remote learning activities during COVID-19? Is there a statistically significant association between time spent planning and time spent in online instruction?

Descriptive statistics showed more than half of early childhood teachers reported to spend between 1 minute and 1 hour ($n = 370, 55.15\%$) providing online instruction to children each day and 2 hours or more a day planning instruction and partnering with families ($n = 289, 43.06\%$; Fig. 1). Through correlation analysis, the amount of time spent planning was statistically significantly correlated with the amount of time spent in online instruction ($r = 0.33, P < 0.001$). This indicates a medium or typical effect size (Morgan, Barrett, Leech, & Gloeckner, 2020). The r^2 indicates that approximately 11% of the variance in time spent in online instruction can be predicted from time spent planning.

3.3. RQ#3: What training did early childhood teachers receive during COVID-19?

Descriptive statistics revealed some early childhood teachers ($n = 303, 25.27\%$) reported that they did not receive any training in providing remote learning during the initial months of school

closures. For those that did receive training, it was most likely to focus on using video conferencing ($n = 251, 20.93\%$), using online tools for instruction ($n = 198, 16.51\%$), or using online tools for communication with families ($n = 118, 9.84\%$). Teachers were less likely to receive training in how to structure online meetings for young children ($n = 92, 7.67\%$), how to provide online lessons for young children ($n = 90, 7.51\%$), how to individualize instruction for children online ($n = 49, 4.09\%$), and how to do small group instruction online ($n = 25, 2.09\%$). Overall, 434 (41%) of the participants reported having no training. For participants that had training, 395 (37%) had training in one area, 96 (9%) had training in two areas, 55 (5%) had training in 3 areas, 35 (3%) had training in four areas, 25 (2%) had training in 5 areas, 11 (1%) had training in 6 areas, 4 (<1%) had training in seven areas, and only 3 (<1%) had training in all 9 areas. Teachers did not differ on other constructs based on the number of areas of training they reported.

Logistic regression was conducted to assess if teachers differed on receiving training based on the age/grade of children served or type of program (i.e., state-funded pre-K, Head Start, private, or parochial/religious). When all predictors were considered together, all but using online breakout sessions for small group instructions and how to deliver telehealth services were statistically significant. Due to smaller than typical effect sizes, further analyses were not conducted.

3.4. RQ #4: What were the perceived positive aspects and challenges of providing remote instruction to young children during COVID-19?

Qualitative analyses of participants' responses to two open-ended questions about what went well and what was challenging during remote learning resulted in 4 themes: (a) children's learning, (b) family partnerships, (c) technology, and (d) emotions (Table 3).

3.4.1. Children's learning

The first theme of children's learning involved positive teacher statements about remote learning going well ($n = 166$ statements, 22%) and children's active participation in lessons ($n = 82, 11\%$). Conversely, educators made 178 statements (20%) describing difficulties teach young children remotely.

Remote Learning Going Well. Several early childhood teachers noted that the remote learning they provided was working well ($n = 166$ statements, 22%). Participant 69 said, "I feel like my lessons are engaging and keeping my students learning." Participant 186 shared "Class Dojo is working well to communicate with the parents to give them the activities and to answer their questions." Participant 268 explained:

"Google Classroom is going really well. 91% of our class is connected and participating. I've gotten great feedback on our weekly choice boards. The parent love that the activities don't require anything extra besides things around their house. The kids LOVE Zoom! I've found that zoom is not a place to actually teach. I use this time for a read aloud then time for socialization (show & tell, etc.). The parents also have told me that the students LOVE to watch the read aloud and the teacher led mini-lessons. Many encourage children to follow along (grab two snacks and let's make an AB pattern, etc.)."

Children Participating in and Enjoying Lessons. Early childhood teachers made 82 statements (11%) that children were participating in and enjoying the online lessons and meetings. Participant 450 described, "The students are enjoying the virtual chats and recorded lessons." Participant 47 stated, "I've heard (the children) enjoy videos of me reading stories and doing activities on the blog. I sent out a bunch of scavenger hunts and that was received well

Table 4
Logistic regression results for services provided by program.

Variable	B	Wald	Odds ratio	95% CI for OR	
				Lower limit	Upper limit
Sharing learning activities that families could do at home					
Infants (under 2 Yr)	2.752	10.652*	15.681	3.003	81.887
Toddlers (2 – 3 Yr old)	1.862	8.552	6.434	1.848	22.402
Preschoolers (3 – 4 Yr old)	2.117	23.711*	8.308	3.543	19.482
Pre-Kindergarteners (4 – 5 Yr old)	2.152	33.615*	8.604	4.156	17.810
State funded pre-K	1.806	24.849*	6.084	2.991	12.375
Head Start	2.344	15.333*	10.418	3.224	33.668
Special Education	21.355	.000	1881370990.018	0.000	.
Private	1.762	15.418*	5.824	2.417	14.035
Parochial or religious	1.590	1.792	4.905	0.478	50.312
Giving families suggestions to support parent-child relationships					
Infants (under 2 Yr)	3.087	14.343*	21.920	4.435	108.329
Toddlers (2 – 3 Yr old)	1.471	7.590	4.355	1.529	12.402
Preschoolers (3 – 4 yr old)	1.086	12.464*	2.962	1.621	5.411
Pre-Kindergarteners (4 – 5 Yr old)	1.578	26.014*	4.845	2.642	8.884
State funded pre-K	1.446	21.543*	4.245	2.306	7.818
Head Start	1.689	18.448*	5.416	2.506	11.709
Special Education	1.445	2.903	4.242	0.805	22.363
Private	1.526	15.519*	4.599	2.153	9.825
Parochial or religious	2.210	3.668	9.116	0.950	87.511
Arranging family competitions, like bake-offs, legos, or crafts					
Infants (under 2 Yr)	0.151	0.014	1.163	0.094	14.445
Toddlers (2 – 3 Yr old)	1.717	3.705	5.568	0.969	31.982
Preschoolers (3 – 4 Yr old)	0.623	1.335	1.864	0.648	5.364
Pre-Kindergarteners (4 – 5 Yr old)	0.787	1.237	2.197	0.549	8.799
State funded pre-K	1.090	2.442	2.973	0.758	11.662
Head Start	0.818	2.300	2.265	0.787	6.516
Special Education	1.185	2.495	3.269	0.752	14.218
Private	-0.094	0.012	0.911	0.168	4.940
Parochial or religious	-17.234	0.000	0.000	0.000	.
Sending families links to online resources					
Infants (under 2 Yr)	2.281	12.517*	9.783	2.765	34.608
Toddlers (2 – 3 Yr old)	1.195	5.289	3.302	1.193	9.141
Preschoolers (3 – 4 Yr old)	1.315	15.017*	3.725	1.915	7.244
Pre-Kindergarteners (4 – 5 Yr old)	2.313	50.903*	10.106	5.353	19.078
State funded pre-K	0.938	8.845	2.556	1.377	4.744
Head Start	1.380	11.613*	3.977	1.798	8.796
Special Education	2.040	4.520	7.691	1.173	50.434
Private	1.455	13.669*	4.284	1.981	9.264
Parochial or religious	0.798	0.708	2.222	0.346	14.269
Delivering Food, Diapers, or Formula to Families					
Infants (under 2 Yr)	1.842	8.205	6.311	1.789	22.264
Toddlers (2 – 3 Yr old)	1.082	3.890	2.951	1.007	8.648
Preschoolers (3 – 4 Yr old)	0.738	6.221	2.091	1.171	3.734
Pre-Kindergarteners (4 – 5 Yr old)	1.441	18.917*	4.226	2.207	8.091
State funded pre-K	1.109	11.653*	3.033	1.604	5.734
Head Start	1.723	28.401*	5.600	2.972	10.554
Special Education	-0.238	0.165	0.788	0.250	2.484
Private	-1.067	4.622	0.344	0.130	0.910
Parochial or religious	-18.926	0.000	0.000	0.000	.
Sharing Community Resources					
Infants (under 2 Yr)	1.826	9.494*	6.209	1.943	19.836
Toddlers (2 – 3 Yr old)	0.172	.109	1.188	.428	3.295
Preschoolers (3 – 4 Yr old)	1.475	26.607*	4.372	2.496	7.658
Pre-Kindergarteners (4 – 5 Yr old)	1.178	14.765*	3.249	1.781	5.926
State funded pre-K	0.671	4.841	1.956	1.076	3.555
Head Start	2.010	36.270*	7.463	3.880	14.354
Special Education	1.418	5.168	4.128	1.216	14.015
Private	-0.082	0.042	0.922	0.420	2.022
Parochial or religious	-19.441	0.000	0.000	0.000	.
Checking in with Families					
Infants (under 2 Yr)	2.793	11.216*	16.322	3.184	83.665
Toddlers (2 – 3 Yr old)	1.568	6.934	4.799	1.493	15.424
Preschoolers (3 – 4 Yr old)	1.715	20.592*	5.559	2.650	11.661
Pre-Kindergarteners (4 – 5 Yr old)	1.584	21.268*	4.873	2.486	9.553
State funded pre-K	2.025	34.490*	7.576	3.854	14.891
Head Start	2.245	18.967*	9.439	3.437	25.923
Special Education	21.438	0.000	2043966045.281	0.000	.
Private	1.737	17.061*	5.681	2.491	12.955
Parochial or religious	2.064	3.055	7.880	0.778	79.781

* $P < 0.002$ (used due to Bonferroni adjustment).

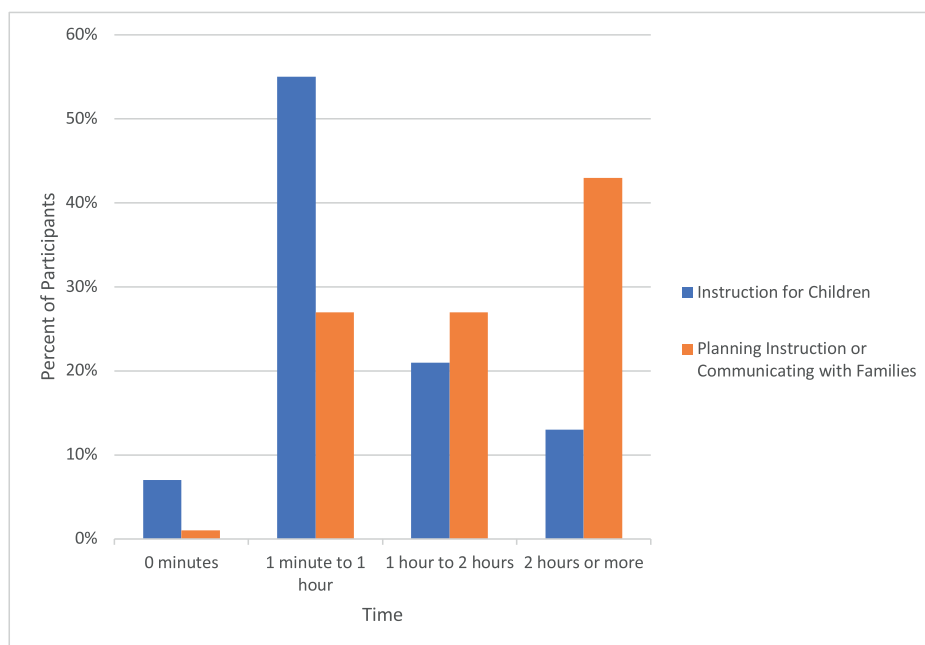


Fig. 1. Time allocated on remote learning activities.

too.” Several teachers noted that children enjoyed Zoom meetings. For instance, participant 100 said, “The children are enjoying seeing their teachers and peers (and themselves!) while on a Zoom group time meeting.” Participant 257 explained, “My students enjoy our online meetings where they can socialize with each other and see each other’s faces.”

Difficult to Teach Children Remotely. On the other hand, many early childhood teachers noted that it was difficult to teach young children remotely ($n = 178, 20\%$). One aspect of the challenge was the perceived incompatibility of remote learning for young children. Participant 2 said, “It’s hard to have little kids on Zoom and keep them focused” and participant 80 shared, “Zoom meetings are rough with 2-year-olds.” Participant 700 explained, “My children are so young, things like Google Classroom aren’t geared for them. Their attention spans are short and trying to teach a hands-on lesson is impossible.” Participant 88 noted the challenge of making remote learning hands-on and interactive for young children: “It is quite a change from the preschool classroom where everything is hands on and we learn through play. Interacting and engaging students through a screen is not fun.” Participant 10 further described how aspects of in person teaching were difficult or impossible to replicate through virtual methods: “I know it sounds obvious, but not having any unplanned face to face time feels like teaching with a blindfold on. I can’t have impromptu conversations with children while they are working and playing to give them feedback and ask them questions.” This lack of in-person contact with children and families was reiterated by other participants and noted as interfering with the individualization and differentiation of lessons online. Participant 104 noted, “It’s harder to meet individual child needs. We can’t check-in with parents daily like during traditional drop off and pick up at school.”

3.4.2. Family partnerships

The second theme of family partnerships involved positive statements about family participation and communication ($n = 259, 34\%$), positive statements noting families’ appreciation of remote learning ($n = 97, 13\%$), and challenges for some families to support their children’s remote learning ($n = 276, 31\%$).

Family Participation and Communication. There were 259 positive statements (34%) related to families’ communication and participation in remote learning with their children. For example, participant 35 stated that “parent engagement is going really well.” Participant 391 noted how parents’ participation during synchronous remote learning activities was helpful: “I appreciate parents who sit with children and make sure that they pay attention.” Participant 520 noted that “communication is going both ways. We’re calling and texting each other.” Participant 339 shared, “Some of my parents are sending me pictures/videos of students completing their work. I am also using Remind to stay in touch with my families.” Participant 100 explained, “I feel like the families and teacher are communicating a lot more and the relationships are continuing to deepen.”

Families’ Appreciation of Remote Learning Activities. Early childhood teachers made 97 statements (13%) describing that families appeared to appreciate remote learning activities. For example, participant 421 said, “I have received great feedback from parents about the activities being appropriate, interactive, and fun for the kids.” Participant 257 stated, “The parents are appreciative of the resources I am sending home as they are trying to keep some sort of schedule at home.” Participant 308 noted, “The feedback from parents regarding lessons has been that it is very helpful to have activities and a format that provides some structure to their day.”

Some Families Not Able to Support Remote Learning. Early childhood teachers made 276 statements (31%) about the challenge of switching from classroom instruction to relying on families to support children’s learning at home. One of the biggest barriers to a successful shift was that some families were not able to support their children’s home learning. Participant 40 explained, “There are some families who are unable to support home learning even when provided with resources (school-issued device, internet hot spots, hard copies) due to time restraints, job conflicts or emotional factors.” Participant 348 noted that “parents don’t have a lot of time to follow through with the activities or meetings due to work at home.” Other families had older children who needed help or use of the technology to complete their remote schooling. Participant 98 said, “We’re having a hard time reaching the families that have other school-aged children who need the technology for their distance learning.”

3.4.3. Technology

The third theme of technology involved positive statements about technology serving to maintain connections between children, families, and educators ($n = 48$, 6%). Challenges were noted related to technology access for teachers and families ($n = 83$, 9%) and the difficulty of learning remote technologies quickly and without support or clear guidelines ($n = 187$, 21%).

Staying Connected. Early childhood teachers reported that technology allowed them to stay connected to children and families in 48 statements (6%). Participant 72 stated, “Remaining connected to the children via online meetings is providing a sense of continuity for all of us!” Participant 567 said that remote learning helped children and families “feel like they are still connected and a part of a community, which is very important.” Participant 456 explained, “Pre-K is supposed to be a non-screen social time, so we are all missing each other, but I like to think our circle time keeps us connected in each other’s hearts while we are away.”

Technology Issues. Educators noted issues with technology in 83 statements (9%); technology challenges interfered with families’ abilities to participate in remote instruction or with teachers’ own abilities to provide high-quality remote learning. Several statements noted that not all children had access to devices at home to use for remote learning. For instance, participant 88 shared that “K-12 families were offered technology, but not our preschool families.” Participant 20 reiterated, “Early Childhood did not receive devices, and although many children in my class have older siblings who received devices or had their own, that is not the case for everyone.” Participant 356 noted that “some students do not have access to the internet. Some cannot view the google meet at the scheduled time.” Early childhood teachers had their own struggles with devices and internet connectivity. Participant 172 said, “I had to borrow a laptop and get internet.” Participant 328 explained, “I do not have good enough internet to be able to do video chats, Zoom, and that type of thing from home. I am allowed in my building but do not have a video camera on my computer or the Wifi password to bring my own.” Participant 96 shared, “We live in a rural area and our internet is often inconsistent which can make online interaction challenging at times.”

Learning Remote Technologies Quickly. Educators made 187 statements (21%) about the challenge of learning how to use online technologies quickly and it not always going well. Participant 26 explained, “Like the families, I have had to learn on the fly. I had a brief amount of time to train for the program I am using. I have had a lot of difficulties adjusting previous lessons for the online format.” Participant 371 shared:

“Our school did have the tech teacher hold daily online help sessions, to help support teachers on this wild ride, but it’s felt like building the airplane mid-flight. Teaching little people online is like trying to keep a bunch of kittens in a cardboard box. You get one’s attention and the others are sticking the pencil up their nose, eating their breakfast, heading off the bathroom, or putting naked Barbies up to the camera.”

Some teachers noted that they lacked prior knowledge of using technology for instruction. For instance, participant 701 said, “I didn’t have the knowledge base of the technology tools that we are using.... Teams, FlipGrid, SeeSaw. I had to get tutorials on those.” Participant 58 said their biggest challenge was “the lack of technical knowledge. I had a steep learning curve due to my age and pedagogical beliefs about hands-on experiences vs using technology and worksheets in the classroom.” Others noted the significant amount of time involved in shifting to remote learning. For instance, participant 51 said, “The amount of time it has taken me to learn and then use the tools has been quite challenging.” Participant 69 noted, “It just takes so much longer to plan and prep for remote learning. I’m not sure why, but it takes much longer!”

Many educators noted that the challenge of quickly adopting learning remote technologies was associated with a lack of guidance or training on their use. Participant 469 stated that “more should have been in place for pre-K children from the beginning. I also believe training for online services would have been effective for teachers. Teachers had to learn on their own and ask each other.” Participant 260 noted the negative impact of “the lack of uniformity of expectations state/nationwide and not being sure if I am doing too little/too much. It feels like I am winging it.” Participant 662 added:

“I literally have no clue what I’m doing, what is expected of me, etc. This is my seventh year teaching and I have been given NO advice or training on how to do digital learning at all. I do not know how to teach through my phone and at best I’ve heard from 3 of my 22 students. There is a lack of communication from the owner and director big time.”

Finally, some early childhood teachers shared that their administration prevented them from implementing some remote technologies, hindering what they could provide to children and families. For example, participant 594 said, “We are limited on what we can do because we are also not allowed to have Zoom conferences in our system.” Participant 745 explained:

“Our principal has said not to add extra to our lessons already sent home (no Zoom, Google Hangouts, etc). It is very hard for me to see all that other teachers are doing around the nation. I feel inadequate in what I am providing and wonder if the parents are judging me for not doing more???”

3.4.4. Emotions

The fourth theme of emotions involved positive statements about feeling a sense of community ($n = 27$, 4%) and statements regarding challenges, such as the difficulty of providing remote learning while balancing demands at home ($n = 66$, 7%) and the emotional toll of the pandemic, workload, and loss of contact with children and families ($n = 47$, 5%).

Sense of Community. Early childhood teachers made 27 statements (4%) about feeling a sense of community that emerged during the difficult time. Examples included participant 114 who said, “We’re still a community and we’re still connected.” Participant 78 stated, “I think that our focus on just staying together in community, the best we can while we’re apart, has driven our decisions and made this weird time pretty successful.” Participant 673 noted deepened relationships between teachers and families:

“The teamwork and communication have been amazing. I feel like this situation has rekindled the relationships between educators and caregivers. We are working as a team to educate the children. I think before, everyone was so busy that it was easier for parents to put the entire workload on the educator...now we are a team with the same goal.”

Work-Life Balance. Several participants described challenges in providing remote learning while also attending to demands at home, including caring for their own children ($n = 66$, 7%). Teachers shared that their own children’s needs interfered with providing high-quality remote learning to their students. For instance, participant 46 explained, “I have 2 children of my own who are also distance learning and need help from me throughout the day. I feel like I am not able to devote the time necessary to plan and implement amazing lessons and instruction to my students right now.” Some teachers described feeling overcome with the responsibilities of teaching and caring for their children at home. Participant 480 described, “I have a husband working full time from home right now, and we have 2 children under two. Childcare falls on me, and then I have to get my work done during their nap

time. It gets pretty overwhelming trying to make sure nothing falls through the cracks.” Participant 663 stated, “I am a mother of 2 young boys. It is tough juggling the responsibilities of homeschooling while simultaneously maintaining the expectations from work and, husband and home. They are all too priorities and I am only one person. It is pretty overwhelming.”

Emotional Toll. Early childhood teachers made 47 statements (5%) that indicated that the pandemic, work demands, and loss of in-person contact with children and families had taken an emotional toll. Examples included participant 73 who said their biggest challenge was “managing my own fears and emotions about the current state” and participant 211 who described, “I feel lost.” Some described increased stress from the demands of remote learning.

Participant 627 explained, “We are now available to the families from early morning until late evening 6 and sometimes 7 days a week. This is added stress and means we have to always be available and in teacher mode with little to no personal downtime to recharge.” Participant 349 shared that they were challenged to know if “what I am spending hours on is even worth it. I have tried to make house calls and no one will answer the door. I am struggling to find meaningful meaning.”

Some participants noted the stress of shifting from working with children in the classroom to working at a computer all day. For instance, participant 647 explained, “I love to work 10 to 12 hours a day, but most of it is with children. Now I work 8 hours in front of a computer.” Finally, several teachers described missing children and feeling a sense of loss from the lack of contact and closure at the end of the school year. Participant 544 said, “I don’t see them. I miss them terribly. I can’t hug and encourage them in person. I think you need to think about how the teachers are feeling.” Participant 584 said that the challenge was “not being able to have some type of closure for us teachers and our students. I really miss not seeing them and being able to plan end of the school year special activities.”

4. Discussion

4.1. Approach to remote learning

Some early childhood teachers who provided remote learning in the early months of the pandemic communicated regularly with families, planned lessons, and met with children either in large and/or small groups. Learning management systems, such as Google Classroom, were used by a number of teachers, with the rest using “do-it-yourself” methods of presenting video lessons and communicating with children and families over platforms like Zoom, Facebook, or through email and phone calls or text messages. These findings match the results found in a survey of K-12 teachers where some teachers used learning technologies designed for remote instruction and the rest used their own materials or resources they found from other teachers or online (Arnett, 2021). Teachers in this study and other emergent literature reported using a mix of online activities and sharing resources, with few replicating the routines of their in-person classrooms (Greenhow, Lewin, & Staudt Willet, 2021). A number of early childhood educators in this study provided no instructional activities at all to children and families during the initial months of the pandemic, matching families’ reports of their young children receiving minimal remote learning during school closures (Barnett, Grafwallner, & Weisenfeld, 2021). These findings contrast with reports indicating that the majority of K-12 educators provided remote learning to their students (Kurtz, 2020).

There were no clear patterns regarding how early childhood teachers from certain programs or age groups provided online instruction to children. There were some statistically significant dif-

ferences, such as teachers of infants being less likely to use an online learning system; however, effect sizes were small. Age and program type differences were more noticeable for how families were supported. Head Start and state-funded pre-K teachers were most likely to deliver food, diapers, or formula and check in with families. These findings match other studies of Head Start teachers prioritizing connections with families during the early months of the pandemic (Jeffrey et al., 2020). It was critical that educators addressed families’ basic needs for food and clothing during school closures. However, it is possible that publicly funded teachers’ instructional efforts were diverted to meeting families’ essential needs while teachers in private childcare were more focused on continuing instruction, leading to inequities in the kinds of learning supports children received during the spring of 2020.

Early educators’ time spent planning and partnering with families was highly correlated with their time spent providing online instruction to children. This finding suggests that some educators spent large amounts of time to both plans and provide instruction to children, while others spent less time each day involved planning, partnering with families, and providing lessons. Early childhood teachers, in this study, that were doing less to support children and families communicated concerns about how well they were doing their job. These worries about the quality of instruction provided during the pandemic were reiterated in other studies of early childhood teachers in the spring of 2020 (e.g., Crawford et al., 2021). Early childhood teachers surveyed in Virginia reported concerns about the lower quality of interactions they had with children and the impact this may have on children’s development during remote learning in the spring of 2020 (e.g., Bassok et al., 2020). Low engagement in learning during the pandemic may be particularly problematic long-term for toddlers, children with disabilities, and other vulnerable populations (Harris, McClain, O’Leary, & Shahidullah, 2021).

Even those early childhood teachers who spent significant time planning and delivering remote lessons during the early months of the pandemic struggled to provide high-quality and engaging activities. Participating teachers noted the difficulty of replicating in-person and play-based approaches they had used in their classrooms to remote learning. It is possible that some teachers struggled to know how to provide playful, engaging, and hands-on online activities, given a lack of previous knowledge in using technology in their teaching (Parette et al., 2010). Early childhood teachers have long struggled with how integrating technology into their play-based instructional approach (Edwards, 2016). Prior to the pandemic, many early childhood educators used technology in restricted ways, such as only using classroom devices to show children a video or communicating with families (Pila et al., 2019). In the absence of regular practice with using technology as a pedagogical tool, most early childhood teachers likely were not prepared to provide remote instruction creatively, especially during the early months of the pandemic. It is possible that early childhood educators gained increasing confidence with the use of technology for remote instruction as the pandemic continued to result in regional school closures in 2020 and beyond.

4.2. Training and supports for educators

The shift to remote learning in the spring of 2020 was rapid, as educational leaders across the U.S. closed schools often without advance warning to school personnel and families. Teachers across all grades did not have immediate guidance or training to perform their jobs from a distance. Early childhood teachers in particular did not have adequate guidance or training about how to provide high quality remote learning to young children and their families. This study did not find any program or age group factors that appeared to significantly influence whether early educa-

tors received training in the early months of the pandemic. While many early childhood teachers reported to receive some training in technology, trainings largely focused on the how-tos of using tools such as Zoom rather than online pedagogical approaches for young children. Early educators described in their open-ended responses that a lack of training and support in using remote learning for young children contributed to their frustration attempting to provide meaningful instruction to their students during school closures.

Sufficient training is a key ingredient for educators to be able to use remote learning effectively (Arnett, 2021). While more early childhood educators were likely trained in remote learning techniques during the summer or fall of 2020, evidence suggests persistent training needs; one study of Texas early childhood teachers showed that 35% of educators still listed training in remote learning as one of their top three professional development needs in November of 2020 (Crawford et al., 2021). Ongoing training should be provided to early childhood educators both on the logistical use of the platforms as well as virtual pedagogical approaches to use with young children and their families.

4.3. Engagement and participation of all families

During the shift to remote learning, teachers moved from providing in-classroom instruction to children to relying on families to support learning at home. Early childhood teachers spent more time planning lessons and communicating with families, as opposed to providing direct instruction to children. Other COVID-19 research findings have similarly found that families were relied on heavily for implementation of children's learning at home (Ford et al., 2021). Increased reliance on families may have been a necessity because young children require an adult to access learning activities and monitor their engagement. However, it may have also reflected early childhood teachers' comfort using technology pre-pandemic to communicate with families. The reliance on families for children's learning had the benefit of families taking a more active role in their children's learning and development while also posing some challenges for early educators.

One of the challenges early childhood teachers expressed was that some families were not able to support their children's remote learning. Some families were not in contact, likely due to other demands on their time and changes in their caregiver roles and responsibilities during the lockdown. Changes to caregiver roles and responsibilities during the pandemic included such things as moving to work at home, potentially keeping a business running, and at least one caregiver taking on the role of educating one or more children at home, while also experiencing health, mental health, and/or financial worries (Goldschmidt, 2020). There is some evidence that middle- and upper-class families globally were well-positioned to adapt their home-based routines in response to the changing demands of schools (Andrew et al., 2020). Teachers, with the support of their administrators, will need to use equitable approaches to digital instruction going forward, including adequate access to technology devices, high-speed internet, instructional resources, and flexible approaches to meet the needs of diverse families.

4.4. The emotional toll of remote learning on teachers

Early childhood teachers are considered at risk for work-related stress under typical circumstances (Buettner, Jeon, Hur, & Garcia, 2016). Primary sources of stress come from feeling unsupported by their administration and struggles with work-life balance (Cumming, 2017). In this study, early childhood teachers noted work-life balance issues that intensified during the switch to remote learning and resulted in feelings of anxiety and being over-

whelmed. This was especially the case for early childhood teachers who had young children at home or school-age children who needed support with their remote learning. Early childhood teachers in this study and others noted that remote learning was accompanied by an increased workload that exacerbated the emotional toll of working during the pandemic (Ford et al., 2021; Tarrant & Nagasawa, 2020).

Early educators also noted feelings of uncertainty, confusion, and frustration during 2020 school closures. Early childhood teachers noted they lacked clear guidance about reopening plans and did not have consistent expectations about what kinds of remote learning to provide to children and families (Crawford et al., 2021; Kim & Asbury, 2020; Tarrant & Nagasawa, 2020). The literature collectively suggests that early childhood teachers need additional resources, logistical support (e.g., childcare options), and emotional support during a crisis, such as a pandemic. These supports will need to change and adapt throughout different stages of a long-term crisis such as the COVID-19 pandemic, such as providing logistical support through the initial adaptive survival stage followed by responsive mental health supports to address the anxiety and depression caused by prolonged uncertainty (de Vroeghe & van den Broek, 2020). Reinforcements may result in early childhood teachers feeling supported, alleviate educators' work stress, and reduce teacher turnover (Eadie et al., 2021; Jeon & Ardeleanu, 2020).

4.5. Limitations

This study has several notable limitations. First, the survey was not assessed for the reliability and validity of its scores. To help alleviate this limitation, several steps were conducted to bolster the trustworthiness of the results, including piloting the survey before its launch, keeping detailed coding records, completing interrater reliability for a percentage of responses, and conducting member checking. Interrater reliability was high and member checking confirmed the study's sub-themes. While percentages of participant statements that aligned to each sub-theme were somewhat low (e.g., range from 4 to 38%), member checking interviews reinforced all sub-themes. Member checking participants highlighted the most prevalent themes and agreed with all sub-themes. Another limitation of the study was the lack of representation of participants in every state of the U.S., a threat to the external validity of the results. It is likely that there were state-by-state differences in early childhood program shifts to remote learning given the piecemeal policies that characterized the U.S. response to the pandemic. State or regional may not have been thoroughly captured. Further, participation in the survey was low from teachers working in some program types, such as parochial schools. The sample approximated national demographic data regarding the race of early childhood teachers, who are largely white (Whitebook, McLean, Austin, & Edwards, 2018). However, representation was low from certain populations of early childhood educators (e.g., Latinx and Asian teachers).

Study findings need to be considered in light of the timing in which the data were collected only a few weeks after teachers had moved to remote learning. It is possible that some findings were representative of this specific point in time during the immediate shift to remote learning. However, the timing of the study provides a unique glimpse into how early childhood educators used remote learning during the initial weeks of school closures; much of the COVID-19 related research was conducted in later months of the pandemic. Future studies should capture the impact of remote learning on children's learning and development, explore alternatives to the use of technology to maintain connections (e.g., home kits dropped off), and study the process and impact of hybrid and HyFlex approaches in early childhood settings (Lohmann, Randolph, & Oh, 2021).

5. Conclusion

Positive innovations occurred during school closures, including teachers' increased familiarity with online tools and deepened family-teacher partnerships. Early childhood leaders and policy-makers should use lessons learned from early childhood teachers during the early stages of COVID-19 to inform their adoption of learning technology, training approaches for early educators, and enhancements for teachers' emotional wellbeing. It is imperative that we take action to support early childhood educators with structural supports, such as professional development, planning time, and digital curricula and tools to carry out high-quality instruction for all young children. Following early childhood teachers' experience providing remote learning, new resources are available with specific recommendations for using technology to support young children's creativity, inquiry, and engagement in developmentally appropriate learning (e.g., Konerman, Horwitz, Clancy, & Rietta, 2022). Professional associations, such as NAEYC, should update their guidance on technology and interactive media use so that early childhood teachers can work towards alignment of their teaching approaches with current recommended practices.

The pandemic has provided an opportunity to further conceptualize how technology might be used to enhance play-based approaches in early childhood settings. Early childhood teachers will need support to navigate the complexities involved in building their own and children's confidence in using technology for learning while maintaining a play-based approach and addressing concerns about screen time. It is hoped that additional resources, policies, training, and wellness supports can address the longstanding inequities within the early childhood system and contribute to an increase in the quality and access to early childhood education for all children.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ecresq.2022.03.003.

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