

Understanding the Experiences of Early Childhood Professionals' Navigation of Remote Teaching and Learning with Technology

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Abstract

How did early childhood professionals transition to developmentally appropriate technology-based learning during the COVID-19 pandemic, and more importantly, how did they adapt and realize their learning and teaching goals for young children? In this study, we examine qualitative interview data from 11 early educators from a range of settings (e.g., schools, libraries, enrichment clubs) who participated in a graduate training program for integrating technology in early childhood in Fall 2020. Participants identified learning goals for children and teaching goals for themselves and their colleagues, which we examined through the lens of technology integration frameworks. In addition to challenges facing rapid virtual transitions, participants revealed successes of immersive technology experiences for children and novel opportunities to assess children's learning.

Introduction

The global COVID-19 pandemic had devastating impacts for early childhood education. A UNICEF report from September 2020 found that only 60% of 188 countries investigated had adopted digital or remote learning policies for pre-primary education (UNICEF, 2020). In the US alone, over 166,000 early childcare workers lost their jobs by October 2020, shrinking the national early education industry by over one-sixth (Bureau of Labor Statistics, 2020).

This upheaval exacerbated existing challenges facing the early education sector, for example, technology integration knowledge gaps in educators who work with children during their earliest years of technology exposure (McLean et al., 2021), and social inequities in children's access to technology required for remote instruction (Dubois et al., 2021). Further, distance learning poses challenges in early childhood, when hands-on and play-based learning are essential (NAEYC, 2020). Pedagogical approaches for integrating technology and STEM in early childhood are emerging as a promising area of focus, but these efforts are still in early adoption stages (e.g., McClure et al., 2017). Given these challenges and opportunities, this qualitative study aimed to investigate how early education professionals used technology to provide care and instruction during the 2020 academic year.

This paper discusses the experiences of 11 early education professionals' navigation of remote teaching and learning with technology. At the time of study, these professionals (henceforth, "participants"), were part-time students at Tufts University's Early Childhood Technology (ECT) graduate program. In this paper we focus on a data set of ethnographic interviews conducted with participants in the Fall 2020 term, collected as part of a larger internal program evaluation. Through these interviews, we aimed to capture participant experiences navigating remote teaching and learning with technology in their respective early childhood settings. Specifically, we sought to address the following research questions:

1. During this shift to remote instruction, what did participants identify as key technology-related learning goals (and for whom)?
2. What did participants identify as successes and limitations in achieving these learning goals?

Background

Other studies have explored the mechanics of shifting from in-person to virtual instruction in early childhood settings, outlining challenges of digital access for families (e.g., Szente, 2020), and limited tech experience in facilitators (e.g., Kim, 2020). In this study, we focused on the ways that technology use changed from previous years, using models of technology integration to inform our analysis.

Various theoretical models have been developed to conceptualize technology integration in education, two well-known ones being TPACK and SAMR (Koehler & Mishra, 2009; Puentedura, 2003). These models provide a multifaceted lens for understanding how teachers and students experience technology integration. More recently, Kimmons, Graham and West (2020) developed a novel theoretical model called PICRAT that examines students' relationship to a technology in a given scenario (passive, interactive, or creative) and the impact of the technology on the educator's previous practice (replacement, amplification, transformation). Researchers can use PICRAT to determine shifting teacher perceptions and practices related to technology integration as a result of professional development intervention (e.g., Heberer, 2021). The current paper will focus on PICRAT as a model to contextualize and interpret results.

We used PICRAT to conceptualize how practitioners navigated remote teaching and learning with young children while they also attended the ECT professional development graduate program. For instance, what kinds of technology-related knowledge did participants identify as lacking in themselves and their colleagues, and how did that impact their education practice? The PICRAT model also proved useful in helping us characterize the transition from in-person to online early education in the context of meaningful changes in practice and learning impacts of chosen technology approaches. Findings may inform future decisions about how to direct technology funding and initiatives to maximize student learning.

Method and Analysis

Of the 30 early education professionals enrolled in the 2020-21 ECT program cohort, 21 consented to study participation, of which 11 individuals participated in the one-on-one interviews discussed in this paper. All study procedures were approved by the Tufts Institutional Review Board (protocol #1810044).

The study sample comprised four Instructional Technology Resource Teachers (ITRTs), five classroom teachers (ranging PreK-3rd grade), one librarian, and one graduate student in the field of STEM education. At the time of the interviews, all participants reported teaching and working with children in all-virtual settings. On average, participants reported having 11.8 years of professional experience ($SD = 5.9$ years) in their respective childcare fields.

Interviews averaged 46 minutes, were conducted using a semi-structured format (Carruthers, 1990), and were recorded and transcribed by the Rev transcription company. In addition, the interviewer collected comprehensive field notes during interviews. Examples of interview

questions included the following: What is your current role? How is your role different this year compared to previous years? Describe your teaching/working setting and goals for the upcoming month. What are any roadblocks or challenges to implementing technology education with your students? What is your general mindset about bringing technology education to your work?

We applied coding techniques from Charmaz' (2006) grounded theory, using a mix of inductive and literature-driven codes informed by the PICRAT model, in line with Deterding and Waters' (2021) flexible coding approach. Two researchers indexed field notes into Excel and conducted several rounds of open-coding to identify and agree on codes related to themes of technology integration and instruction. Codes were then sorted into categories, and we conducted a final round of coding to determine trends related to student experiences and adult practices involving technology. Individual cases were explored for consistency with our hypotheses about these trends and informed limitations in our interpretations.

Results

The following results organize participant responses as they relate to our research questions. Results are then characterized according to our guiding theoretical PICRAT framework (see Figure 1).

Our first question related to what participants identified as key technology-related learning goals (and for whom) during the shift to remote instruction. Participant responses converged around "child-centered goals" for their young learners, and "adult-centered goals" for themselves or their colleagues (see Table 1). When it came to child-centered goals, participants emphasized the importance of raising technological competence (e.g., with computer interfaces, keyboarding skills, Zoom software) in young learners. Participants named their own technological proficiency as a key component of supporting children in accessing technological tools. Of the learning goals participants identified for children, two goals (developing technological competence and accessing virtual content) seemed to represent a wish to shift a child's relationship with technology (primarily computers or tablet devices) from passive observation to interactive engagement, especially challenging for early learners who thrive in dynamic environments with a variety of interactive modalities. In comparison, the learning goal of integrating a variety of technologies showed that participants still sought ways to elevate interactive technology experiences to child-directed creative ones, often using this as a relief valve for students feeling overwhelmed or disengaged during remote instruction.

The most common adult-centered goals that participants identified were related to successfully transitioning to a new virtual learning environment. Specifically, participants named the adult-centered goal of seeking ways to help young children build relationships with their learning community (e.g., classroom cohort), as well as maintain engagement with on-screen instruction and programming. To paraphrase one participant (a classroom educator), usually the first month of Kindergarten is about helping children learn to engage with a classroom, but this year it was about learning to engage with a device. Participants also wished to quickly build comfort and proficiency with leading activities, programming, and resource sharing in virtual settings. Of the adult-centered teaching goals, two (transitioning to virtual learning and supporting colleagues with tech competence) aligned most with simply replacing in-person facilitation practices. We determined that the goal of fostering a positive virtual learning climate was best categorized as

an amplification of traditional early education practice, since it represents a meaningful extension of the same kind of work that happens during in-person programming.

Participants working in school settings were concerned with assessment of learning in the new virtual format. Four participants (three teachers and one ITRT) felt that there was even more learning data available compared to prior years due to the online environment. One teacher said, “when we’re at school, [...] it’s more experiential. Now [we’re] making sure we [can] show what we did, and share with parents. We have so much evidence of the work we do, it’s different [from in-person teaching]”. Two teachers further noted how critical it would be to interpret and use those data to inform lessons moving forward. The goal of assessing children’s learning in various ways was the one transformational goal we identified in our PICRAT matrix, and primarily emerged in our teacher participants. We named this goal as transformational because adults described using technology to allow children novel and creative ways to share their learning, and also mentioned that technology-based assessment provided new *kinds* of information (e.g., real-time mouse clicks).

Our second question focused on what participants identified as limitations and successes in achieving their learning goals. Participants identified gaps in technology access and experience as a challenge for both children and adults. Children’s learning was hindered by lack of engagement in online modalities, lost learning time due to troubleshooting, challenges of navigating digital interfaces, and in schools, schedules overburdened by district-mandated assessments. Facilitators faced emotional difficulties caused by longer required lead-time in planning activities (and thus, less flexibility to adapt on-the-fly), technological challenges of adopting new software on home computers, and perceived isolation from their community of colleagues.

Participants mentioned some benefits to children’s learning from accelerated technology immersion. One teacher mentioned that her students this year learned to use the computer and navigate programs more quickly than in the classroom. Another teacher participant discussed the positive emotional value of using online assessment data to inform her lesson planning, saying “[my colleagues and I] feel defeated when kids don’t get things done, but looking at their assessment scores, it’s like ‘oh, they are getting it.’” Nine participants, including a librarian and a full-time graduate student, mentioned introducing new technological tools (e.g., Code.org, ToonTastic, Roblox, ScratchJr) as ways to keep children engaged and maintain a playful digital learning environment. Successes for facilitation and teaching included more time for asynchronous planning, preparation, and mental breaks between learning times. Six participants also mentioned that remote learning increased time to revamp physical spaces and think about future in-person activities. One participant also mentioned opportunities to reflect on and refine her teaching approach to learn what children could do (see Table 1). We interpret these findings to mean that a primary challenge of early childcare and education during the pandemic involved quickly finding ways to take advantage of the opportunities presented by technology, both as a replacement for traditional facilitation strategies, and as a platform to explore new methods and approaches.

Significance

The evidence presented in this paper aligns with what many childcare workers already know, that pandemic education and early childcare faced the challenge of “flying the plane while building it” (Brown, 2020). Gaining access to technology was a main challenge, followed by fostering sufficient skills among educators and children to use it. Moving forward, we echo Reza, 2020’s call to increase equity and inclusion in tech education by promoting high-quality integration practices, and focusing on digital competence as well as equipment access in early childhood. The importance of professional development in this endeavor is hard to overstate. In our results, we saw a trend of participants in our graduate training program finding ways to optimistically use technology integration to amplify teaching practices (particularly around community building and student engagement) and even radically reimagine the way they assess the quality and pace of student learning. These results, in the midst of a pandemic that crippled the education sector, tell an extremely heartening story about the resilience of early educators and practitioners who are empowered with technology-focused pedagogical training.

Our study further highlights the need to examine collective learning about successful tech integration to lead the way forward. An estimated \$26 to \$41 billion are invested in education technology by US public schools each year (EdTech Evidence Exchange, 2021), which during the pandemic, yielded innovative approaches such as traveling WiFi-hotspot school buses and accelerated one-to-one device program roll-outs in many districts (e.g., Sullivan et al., 2021). We now have an opportunity to critically examine what worked in the last year of remote instruction—such as the increased planning and professional development time named by participants in our study—and create data-driven approaches to enhance early 21st century learning. One step toward this goal is to explore the role of training programs like ECT in early childhood technology adaptation. In future work, we aim to collect more interviews and surveys to explore the longitudinal impacts of a technology training program on educators’ adaptation to increasingly technology-rich teaching and learning.

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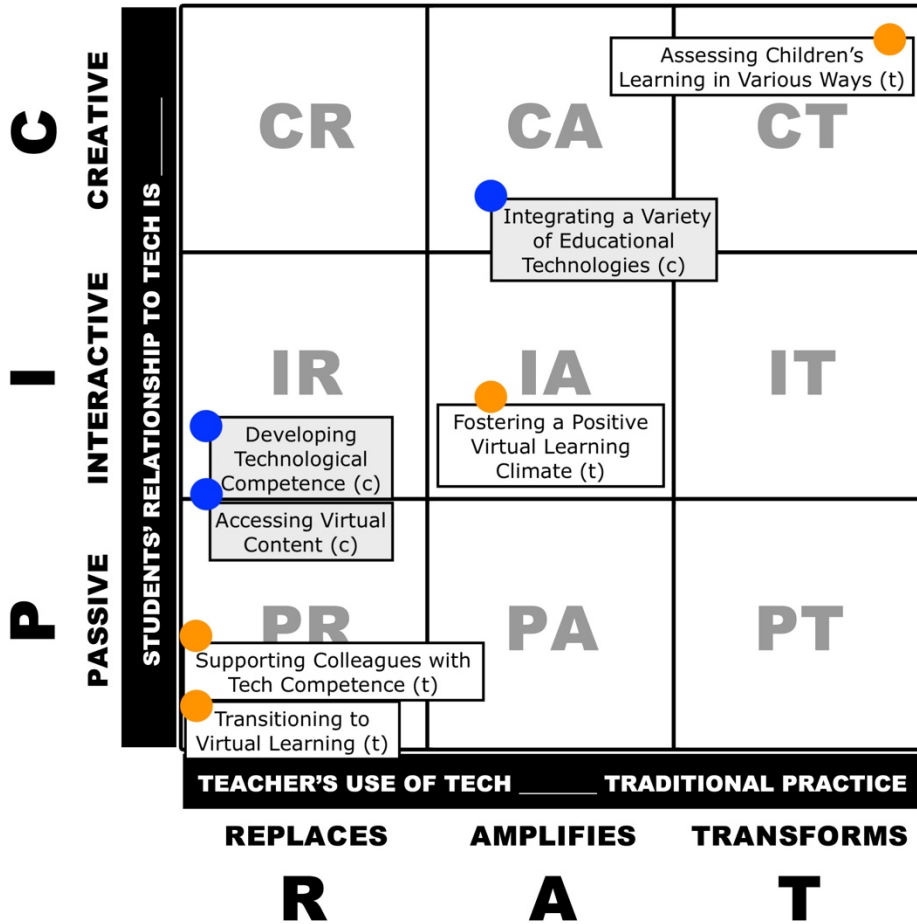
Table 1. *Technology-Related Learning Goals Identified by Participants*

	Goal	Case Examples	Successes	Challenges
Child-Centered Goals	Develop technological competence (e.g., with computer interface, keyboarding, Zoom software)	We're all online. With kindergarten that presents some unique challenges because a lot of them have never been in school before. They've played with phones and iPads for fun, like watching YouTube and doing stuff like that. But the idea of using a <i>device</i> , let alone a computer, is foreign to a lot of them. [Our district] checked out Chromebooks to most of our kids, but even simple stuff like having to use a track pad and type... Normally the first month of kindergarten is like, "Hi, welcome. Let's play. Let's learn. This is how we sit on a carpet." And instead, day one, I was over here with my Mute/Unmute signs, saying, "Okay, find this button and try to push it." (Participant 9)	<ul style="list-style-type: none"> • More exposure to technology • Enhanced autonomy and confidence with navigating digital devices • Opportunity to explore novel educational technologies 	<ul style="list-style-type: none"> • Gaps in technology skills • Unequal access to internet and/or digital devices • Home/family environment being "distracting" or "chaotic" • Losing interest with online learning • Tasks take longer in virtual setting • Harder to troubleshoot issues when children's screens aren't visible • Instructional time lost due to troubleshooting technical issues • Instructional time lost due to district-mandated testing
	Access curriculum/instructional materials in virtual learning environment	I had a group of students who were low income, did not have internet and did not have Chromebooks. So, I couldn't offer Zoom for my class, since not everybody could sign in, I had to make sure that whatever I offered was obtainable for all students. Otherwise, it's not fair. I was calling students and once we got everybody internet and everybody had a Chromebook, that had to have been by the end of May. So, we only got to do five zoom classes together. (Participant 11)		
	Use a variety of educational technologies for learning and enrichment (e.g., Flipgrid, Code.org,	Our issue is a lot of our kids are not on grade level and that's when the frustration comes out in the classroom. And so when we have code.org, it levels the frustration because it reminds them of something that's like a game to them. [...] Even though there's also reading in the code.org activities, they don't see it that way. Because it feels like a game. (Participant 4)		

	Toontastic, ScratchJr)			
Adult-Centered Goals	Successfully transition to virtual learning environment (e.g., Zoom, Canvas)	Our audience is everybody. We have a public library in our audience [...] we haven't yet done any zoom interaction programs. We've done some concerts, you know, come get on Facebook at five [for some] music stuff. But, meanwhile, I've been upping my educational materials [library] collection for homeschool parents. (Participant 6)	<ul style="list-style-type: none"> • Creating innovative virtual content and revamping physical spaces • Having an asynchronous day for planning and mental break • Collaborating with colleagues • Previous familiarity with educational technologies • Examining student assessment data and seeing students were showing progress 	<ul style="list-style-type: none"> • District-wide tech shutdown due to hacking • Lack of organic opportunities to connect with colleagues • Mandates to share information district-wide, which takes longer to set up • Lesson planning takes longer • Needing additional support from families
	Foster positive and engaging virtual learning climate	Now we've been doing our alphabet, so find something that starts with a J, find something starts with a K ...we just call it Fun Fridays. So it gives them something to look forward to before we start dabbling into the academic portion and I feel like I can reach them more that way. (Participant 4)		
	Assess student knowledge in various ways to inform practice	We still have assessments. And instead of me getting riled up, like, "okay, they must show growth, they must show that they can do it, they must think that I'm teaching," I have to say, look, the only way to know if you're teaching is if you let them answer. Don't try to just make them regurgitate information, let them tell you what they know. And also, let them design a way that they can learn it better. (Participant 3)		
	Support colleagues with developing technological competence	It's like the kids do asynchronous work and the teachers do like professional development. Each week I do a district wide PD, like one or two of them. And then I offer specific ones for my building that I think would be helpful for [my teachers]. (Participant 8)		

Figure 1.

Teaching and learning goals identified by our sample, organized according to the PICRAT matrix (Kimmons et al., 2020).



Note. Dots represent general locations for each learning goal on the matrix. Shaded boxes with blue dots and (c) labels represent learning goals for children. Orange dots with white boxes and (t) labels represent teaching/facilitation goals for adults.