Families and Media Multi-tasking: Reorganizing Collaborative Learning at Home

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Abstract: As the number of tools available for learning within computer-based tasks proliferates, so too do the tasks. This paper describes how families use technology and new media for multi-tasking in order to collaboratively accomplish many routine tasks around their homes. Families employ a number of approaches to media multi-tasking, and their sociotechnical practices reflect how children learn *to* multi-task, learn *through* multi-tasking, and learn *despite* multi-tasking. I draw on these practices to explain how families manage shared- and divergent -objects of activity at home, and how technology is implicated in this maintenance work. I offer a multi-dimensional framework for multi-tasking that suggests how determining what is consequential for learning with technology is often contingent on a number of tools, tasks, purposes, and people.

Introduction

On a bright April day, after nine-year-old twins Oscar and Eddie had returned home from school, I interviewed their mom Steph about her sons' technology routines. After detailing their "daily media round", or all the routine places people go and things they do with media and technology (Taylor, Takeuchi & Stevens, 2017), Steph described some of the activities they did as a family on a more infrequent basis. For example, she participated in several community organizations, and the twins usually accompanied her when she attended weekly or biweekly meetings. Steph gave the following account of her sons' involvement during such family outings.

> If they want to take off the headphones and engage in the dialog at the meeting, they can participate and soak things in. Sometimes in the car on the way home they start to talk about what the adults were discussing. Even though they are [playing] on their tablets or with their headphones, they are still soaking in what's going on around them. *They are obviously multi-tasking*, because they will reengage in the conversation [emphasis added].

Later in this paper I will describe how the twins (and their mom) accomplished such multi-tasking, a phenomenon I observed across all the families I studied. This paper examines how families' approaches to media engagement allow learners to "soak in what's going on around them" despite multiple demands on their attention.

In any given day, families must accomplish meal prep and eating, clean-up and chores, commuting, attending school, paid work, homework, community meetings and parties, shopping, sports or music practice, paying bills, worship, play time, pet care, bedtime, and more. The work is never done, and in today's socioeconomic context, families are busier than ever (Ochs & Kremer-Sadlik, 2013). But, as Graesch (2009) suggested, "busier families are not necessarily working harder or longer hours, but instead are having to reconfigure their lives around a growing number of bids for their attention" (p. 86). How is it that families manage to do more in the same amount of time? How is technology involved in reconfiguring family life? What material and human resources must they collaboratively assemble to manage it all? This paper examines multi-tasking as one response to these questions and explores how it is part and parcel of learning in new media ecologies (Barron et al., 2009).

The current paper represents a condensed version of a longer dissertation chapter analyzing media multi-tasking in the context of family life. In what follows, I address the question: *what forms of collaborative activity does multi-tasking make possible, and how do families collaboratively contribute to what ends being consequential for learning?* Drawing on three instances of families' media multi-tasking, I interrogate school-like notions of being "on task" and instead take the perspective that multi-tasking is intrinsic to most everyday activities. I elaborate dimensions of multi-tasking that bear on learning: how tasks involve arranging for multiple sub-tasks, multiple tools, multiple purposes, and multiple people. Analyzing instances of families' multi-tasking across these dimensions showed how families collaboratively organize activities to learn *through*, learn *to*, and learn *despite* multi-tasking.

At stake across all these elements of multi-tasking is a question of whose perspective on a task matters

for learning. Children and adults have different views of what they want to accomplish during precious hours spent at home (Goodwin & Cekaite, 2018). Likewise, their objectives within a shared task can vary; adults may see media engagement as useful for one purpose, while for children, it serves an entirely different aim. Children frequently choose the course of their media engagement; however, doing so in ways that conform to families' shared rules and norms can necessitate children's multi-tasking. Multi-tasking then becomes a lens through which what is consequential *for learners* becomes visible, opening up endogenous perspectives with the potential to expand what counts as meaningful media engagement and learning and for whom (Hall & Jurow, 2015; Stevens, 2000). Viewed in this way, routine tasks are sites of on-going negotiation in families, where multi-tasking can resolve- or renew- tensions over technology use. As the current analysis will show, home is a powered place, where decisions about sociotechnical practices are charged and pivot around multiple tools, people, objectives, and tasks.

Conceptual framework

According to some researchers, young people are both the biggest multi-taskers and the ones least likely to perform well while multi-tasking (Rosen, Carrier & Cheever, 2013). Because multi-tasking performance has consistently been found to improve with age, teaching and learning has been a major focus of multi-tasking research. And perhaps unsurprisingly, in recent years, given the proliferation of mobile media and screen-based learning designs, there has been renewed interest in multi-tasking research. Lin and colleagues (2011) have produced a number of studies of media multi-tasking (MMT), which they define in terms of dual-tasking, as "engaging in multiple media and tasks simultaneously" (P. 183), for example reading a news story while watching a video (Lin, Mills, Ifenthaler &, 2016). The bulk of literature has pointed to negative effects of media multi-tasking on studying at home (Rosen et al., 2013), classroom learning (Wood et al., 2012), and social success of young people (Pea et al., 2012).

Studies of families' multi-tasking leave the distinct impression that children either *are* primary distractions (for parents) or they are primarily distracted *by* media (Craig, 2016). While there may be some truth to this gloss on family multi-tasking, it neglects how children's learning might be involved in new forms of media multi-tasking or how learning may be supported through collaborations with other family members (Shapiro et al., 2017; Silvis, Taylor & Stevens, 2018b; Lin et al., 2016). Recently, Mejía-Arauz and colleagues (2018) have examined collaborative learning at home, distinguishing between task objectives that are met through "negotiation," completed individually and then combined together, and those achieved "collaboratively," through joint synchronous activity. This work points to how families' collaborative activities frequently exhibit multi-tasking during culturally valued routines like cleaning, cooking, care-giving, or conversing, though this was more normative in families from non-dominant backgrounds, such as Mexican heritage families.

In other research with families, joint media engagement (JME) may also provide a supportive collaborative context for multi-party media multi-tasking (Takeuchi & Stevens, 2011. Studies of JME have by and large looked at how multiple people arrange for learning around *single* devices or media, which are generally digital. However, in today's dynamic media ecologies, digital technologies are not the sole means of multi-tasking (e.g. Andrade, 2010). A significant amount of paper-based activities persist in homes and are interleaved with screen-based activities. Therefore, multi-tasking not only involves doing multiple tasks at once, it also represents a *multi-tooled* approach to tasks. As collaborators, whose labor is distributed, draw these materials together in-task, the task itself may break down into multiple sub-tasks, with separate objectives that must be articulated and coordinated (Stevens, 2000).

The nature of task objectives is a central issue in research on multi-tasking. A single task may achieve multiple aims (Engeström, 2001). Take for example a routine activity like checking email. Because many different topics and tasks sit within different email messages, the objects of an activity such as "checking email" can range from coordinating a meeting with colleagues to getting the latest deals on produce from the local grocery store. Task objectives proliferate in complex media environments, even within a single task. Engeström suggests how "the object of activity is a moving target, not reducible to conscious short-term goals" (p. 136). There is no "task" only "task(s)" as people and objects co-construct them. Or, as Erickson (2016) has commented, "in any human interaction, there is always more than one thing going on at the same time." Relatedly, activities that serve one person's objectives may engage someone else in the family for a variety of different reasons, only some of which are shared among collaborators. Managing interactional "floors" (i.e. interactional spaces for establishing topics or tasks), then requires balancing dynamic tasks and topics across time and space (Erickson, 2004). Multi-tasking,

therefore, is not only a means of accomplishing multiple discreet *tasks* or sub-tasks with multiple *tools*, it is also *multi-party* and responds to the *multiple purposes* of different participants.

Study design and methods

In this analysis, I take a situated view of learning (Brown, Collins & Duguid, 1989; Lave & Wenger, 1991) and draw on data collected in an ethnographic study of family life at home as it is currently being transformed by new (especially mobile) forms of media and technology. Participants included eighteen focal children in twelve families from diverse racial, ethnic, geographic, and socioeconomic backgrounds. Participants were recruited from local youth-serving organizations, camps, and other places where young people between the ages of nine and thirteen years old spend time; this period of development is significant for media engagement because it is about the time when children get their own devices (Rideout & Katz, 2016).

Data collection in this ethnographic study of families "daily media rounds" (Taylor, Takeuchi & Stevens, 2017) took place over two years in two separate US cities, and methods included the following: semi-structured interviews with parents and children (48 total); video recorded observations conducted during home visits, some of which were recorded by children using point-of-view cameras (i.e. GoPros®) (approx. 100 hrs); experience sampling through nightly phone calls (90 total calls), and a novel research activity for digital mapping of participants' technology use (Silvis, Taylor & Stevens, 2018a), which was also video recorded (16 digital artifacts). To answer the research questions- how families' media multi-tasking organizes learning arrangements- I drew on ethnographic and interaction analysis (Jordan & Henderson, 1995). I produced multi-modal transcription of the talk, gesture, gaze, coordination of body movements (or lack thereof), uptake of tools, use of space, and other aspects that played into moment-to-moment interactions (Tulbert & Goodwin, 2011).

Analytic findings

A wide variety of everyday tasks took place across families participating in the study. I analyzed a number of key instances where multiple people, tools, tasks, and aims were being configured and re-configured, as opposed to those where a child was independently engaged with a single task for a period of time (i.e. reading a book or e-book for thirty minutes without interruption, doing math homework at the kitchen table before moving on to play time). Looking across tasks that were multi-tooled, multi-party, multi-purpose and involved multiple sub-tasks, a number of patterns emerged. I found that families approaches to multi-tasking supported children learning *through* multi-tasking, learning *to* multi-task, and learning *despite* multi-tasking. These patterns reflect the dynamics of multiple dimensions of multi-tasking in-task (i.e. multiple tools, people, tasks, and aims). In what follows, I focus on three instances of children multi-tasking, emphasizing the role of collaboration in each case. Each of these examples serves as a representative case of three ways in which multi-tasking relates to learning.

Learning *through* multi-tasking using a single device

Because wired digital technologies afford endless possibilities for media engagement, a single device can organize a space for a great deal of media multi-tasking. Katherine, a ten-year-old girl whose family had recently moved to a large city in the Northwest US from Shanghai, was rarely without her prized possession, a MacBook Air. According to her mom, when she was not participating in a summer program, taking ballet lessons, or making plans to attend her new school in the fall, Katherine was inseparable from this mobile device. She relied on the tool for a myriad of activities including: *tasks assigned by her Mom* (e.g. researching animal shelters where they could adopt a family dog or places where they could go to explore their new city); *homework assigned by teachers* (e.g. mythology reading, poetry writing); *preparing for school in the fall* (e.g. checking summer reading list, studying for a gifted program placement test); *learning about topics of interest* (e.g. receiving a video from a friend in her Kitchen Chemistry class, receiving email from a list serve about "science-y" cooking); and *independently surfing websites for news or videos* (e.g. watching an old episode of Pokémon on YouTube, reading articles in her news feed).

During one visit to her home, I observed how Katherine used her laptop over the course of an hour for a number of separate and simultaneous activities, a practice I call *"single-device multi-tasking."* Zeroing in on this observation alone illustrates the density of media multi-tasking Katherine engaged in during more than an hour spent using her laptop. As she worked, a single device provided the means of easily multi-tasking by tabbing back and forth between active windows, continuously checking the status of uploads, or opening new windows and programs in order to accomplish a task at hand. When I joined her in her bedroom work site on this day, Katherine was already busy working on a video she had animated in QuickTime the previous evening. She was uploading it to a site called Magisto.com, that hosts videos for sharing or publishing on social media. While this underlying activity progressed in the background, she busied herself with a number of other tasks (Figure 1).
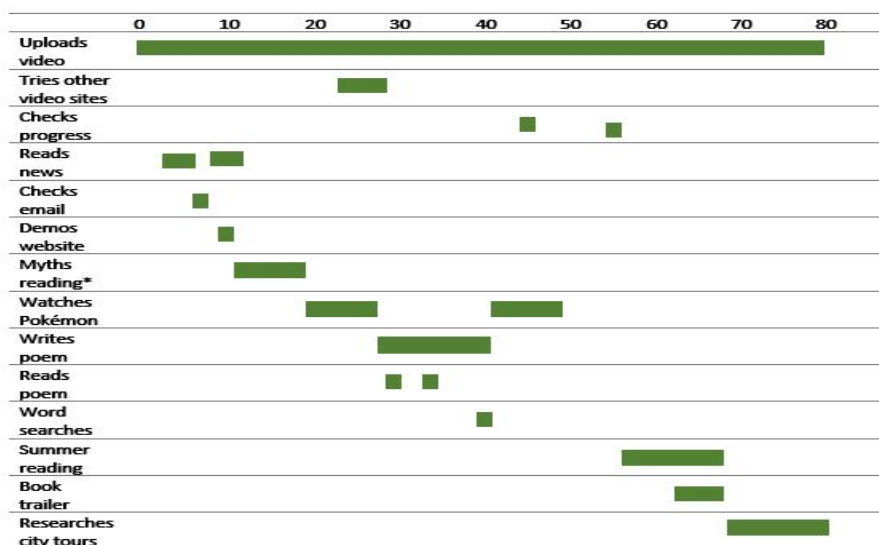
Figure 1. Single device multi-tasking. Timeline (in minutes) of all the separate, overlapping, tasks Katherine engaged in during a single observation. *Except for Mythology reading, all of these tasks utilized only her laptop.

After about thirty minutes (and at least seven discreet tasks), Katherine began composing a poem in a Google Doc that she shared with her summer program writing teacher, who provided her with virtual feedback. A few minutes into her poetry writing, Katherine opened Google Images in a separate tab, something she said she sometimes did "for inspiration." She referred to several images of poems, tabbing back and forth between these and the one she was authoring, and eventually positioning multiple windows in order to simultaneously view multiple poems on screen. When she hit an impasse in her writing, she opened up another tab to search on Thesaurus.com, which she identified as her "favorite website." In the course of writing the poem, she managed the display by juxtaposing- and tabbing back and forth between- these multiple tabs and windows. Configuring multiple resources on-screen enabled her to navigate sub-tasks in a way that supported learning through multi-tasking.

After working on the poem for fifteen minutes, she resumed watching an episode of Pokémon on YouTube that she had interrupted to write the poem, and later moved on to do some research on *Animal Farm*, which was on her summer reading list for school next fall. However, she kept open the multiple tabs she had used to write the poem, so it was possible to return to the task later on. Katherine's multi-tasking led her across multiple sites and platforms to engage in multiple tasks using a single device. She was able to learn about poems, literature, vocabulary, and much more through her multi-tasking and also with the help of virtual collaborators. In the course of my observations, she interacted with her friends, her mom, and her dance teacher via email. At any given time, a wired laptop gives young people multiple avenues for interaction, and who they choose to connect to shifts as the focal task changes. Consequently, learning through single-device multi-tasking is not adequately characterized as a solo activity, nor does it simply serve as a means of individual efficiency or personal productivity. Media multi-tasking is mutually monitored by multiple collaborators (Goodwin & Cekaite, 2018)- albeit virtually and asynchronously. Even when a single person uses a single device, multi-tasking demands- and is a response to demands for- collaborative learning across tools, people, and tasks.

Learning *to* multi-task by mixing tools and negotiating objectives

For Katherine, a single tool became a site for organizing learning through multi-tasking across heterogeneous objects of activity. Conversely, it was often the case for the families I studied that a single *task* became a site for learning to multi-task across multiple tools and task objectives. In today's media ecologies, families have many options for equipping and jointly accomplishing routine tasks. Often, family members' purposes for performing tasks vary and need to be negotiated amongst people and devices. Placing a multi-tasking lens on a single task can surface the often hidden sociotechnical work required to stabilize a task so that people can jointly accomplish their aims with multiple technologies (Star, 1990; Stevens, 2000). Learning to multi-task becomes necessary when task-objectives diverge, when tools are distributed, or when one person delegates their task to another.

Such was the case when Natalie, an eleven-year-old who lived with her grandmother and mother Gina near a

large Midwestern US city, helped her mom complete an Excel spreadsheet containing information from a survey Gina had distributed at work at a local service organization. Gina introduced the task to Natalie as work they could do together, enlisting her daughter in her own work as a valued coparticipant. Barron and colleagues (2009) referred to this arrangement as "parents as employers," a situation that arises when parents "entrust their technologically skilled children to perform technical services for them" (p. 69). Rifling through the questionnaires, Gina told Natalie that they needed to make a spreadsheet and that Natalie could do the data entry. When Natalie was unsure of what this meant and feigned resistance, claiming it was a weekend and she shouldn't have to work, her Mom reassured her by playfully smacking her arm and announcing that Natalie was going to learn something new. What for adults may seem mundane (e.g. building a spreadsheet, doing data entry) presents productive challenges and novel tasks for young learners, who may have very different task objectives and motives than their adult collaborators.

It is also important to note here that Natalie was recruited *by her Mom* to do this work, which is a different starting point for the delegation of young people's computer-based work that typically originates outside the home in school. As opposed to homework assigned by a teacher, where a single task is undertaken for the putative purpose of completing an assignment (or earning a grade), building an Excel spreadsheet was more multi-purpose; this contributed to the pair approaching their task with divergent objectives. Gina reported that she often recruited Natalie into tasks for her job if technology was involved, in order to teach her daughter new technical skills. For Natalie, spending time with her Mom during their free time on a Saturday was a powerful motive for completing data entry, a task that adults may view as thankless grunt work and some children might regard as a pointless chore. Learning to build a spreadsheet entailed learning to negotiate multiple people's objectives in-task and to coordinate their separate sub-tasks. Therefore, in addition to learning to use Excel, Natalie was also learning to multi-task.
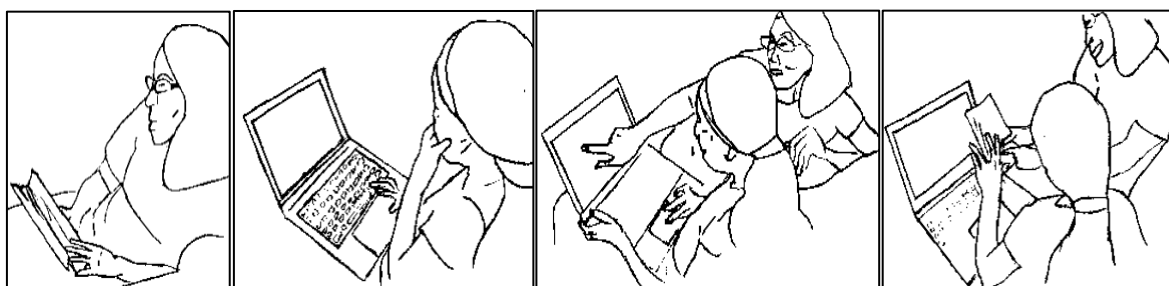

Figure 2. Multiple tools within a task. *(Left to right)* Natalie's mom reports information from paper-based surveys; Natalie enters data into Excel spreadsheet; they collaborate over the screen; they collaborate over paper.

Learning *to* multi-task meant drawing on multiple material means of mediation as well. As they began the spreadsheet together on the couch in the living room, Gina held the paper surveys, while Natalie was responsible for computer data entry (Figure 2). Despite the proliferation of digital means of doing domestic tasks, there is continued need to mix multiple types of tools together to accomplish a task (Silvis et al., 2018b), and paper is still a widely used resource for collaborative knowledge work (Brown & Duguid, 2017). The mixing of technologies within a single task was pervasive in children's activities across all the families we observed; this spreadsheet multi-tasking literally spread the task out across sheets of paper, software, and screens and fractured the single task into sub-components made visible through an emergent division of labor. Learning to build a spreadsheet meant learning to multi-task by drawing on- and drawing together- multiple material means and multiple learning objectives.

Learning *despite* multi-tasking as domestic complexity multiplies

The complexities of maintaining everyday routines and organizing family life are compounded when multiple people employ multiple technologies across multiple tasks, timeframes, and spaces. A family of three, with jobs, hobbies, school, and close family who lived nearby, multi-tasking was typical in the Hernandez household. This was exemplified one day after school when nine-year-old twins Eddie and Oscar completed a homework assignment with their mother's assistance. In this example, multi-tasking was multiplied through the complex spatiotemporal and material arrangements, whereby people accomplish a number of different tasks together at home. When I arrived to observe them one day after school, Oscar and Eddie were already immersed in their typical after-school routine: watching TV, completing homework, and playing video games. Their homework

assignment on this particular day was an on-going project in their language arts class that asked them to create a book cover for their favorite book. Both Eddie and Oscar had chosen to create book covers based on *Pokémon Deluxe Essential Handbook*, an encyclopedia of over seven hundred Pokémon, thoroughly dog-eared and annotated by the twins, who each had their own copy.

Rounds of working on homework, which the boys completed primarily at the kitchen table, were punctuated by "technology breaks," a strategy their family implemented in the afternoons each day after school. The twins' breaks occurred at different times, creating a dynamic task environment in which tasks were not entirely distinct. For example, the TV stayed on in the background while they worked on their homework, compelling the twins to engage in dual-tasking and splitting their attention during tasks (Lin et al., 2011). For his part, Eddie designed and colored his book cover illustration while watching cartoons, and later continued watching TV while taking a technology break and playing *Angry Birds* on his tablet. However, with multiple people engaged in multiple tasks simultaneously, multi-tasking quickly multiplied. The living room was usually reserved for technology breaks, but Steph made an exception so that Oscar could research a Pokémon illustrator for the back flap of *his* book cover at a moment when Eddie's work crowded the kitchen table. Oscar and Steph sat comfortably together in a side-by-side configuration, co-viewing her laptop screen while he worked (and stole glances at the TV), a prototypical configuration of bodies during JME (Takeuchi & Stevens, 2011).

As in any complex learning environment, there are always multiple things going on at once (Erickson, 2016). While the twins did their homework, their mom was busy coordinating the delivery of new furniture for their bedroom. Steph had told the boys that she wanted them to each tip the movers one dollar for assembling their furniture, and she placed two one-dollar bills in the threshold between the kitchen and living room, directly in the pathway the twins would likely travel (Figure 3). She likened this to tipping the pizza guy, and she emphasized to them that "I want you to tip them because they're providing a service." The boys meanwhile remained unresponsive and continued gazing at the TV from the kitchen table where they worked. A short time later, Oscar and Eddie raced down the hall after snatching up the bills, and they diligently tipped the movers who subsequently departed. Mom immediately noticed that the movers had left their drill in the entrance hallway and chased after them down the driveway. Eddie wryly commented "maybe that is a tip for *us*," referring to the drill. This re-voicing of his mother's task directive indicates how he had heard and understood her words in a way that allowed him to recycle them in an entirely different context (Goodwin, 2018). Whereas, several weeks prior, Steph had reported how the twins were able to "soak things in" despite their multi-tasking, in this instance they demonstrated how this looks in practice. Despite their media multi-tasking, Eddie and Oscar learned valuable lessons about what it means to contribute to household routines and collaborations, where multiple tasks vie for people's attentional resources.

Figure 3. Multiplying media multi-tasking. Mom and Eddie both discuss "tipping" the delivery guys, despite the demands of multiple tasks, people, and tools in their home media ecology.

Conclusions and implications

Across these three cases, I have shown how media multi-tasking supports learning at home and some forms that multi-tasking can take, including *single-device multi-tasking*, *mixing materials and multiple purposes within a single task*, and *multiplying multi-tasking* by adding more tasks and people to the task setting. I have used these examples to elaborate how children learn *through*, learn *to*, and learn *despite* multi-tasking. Families' designs for learning at home support these forms of multi-tasking, and this takes sustained interactional work and

intergenerational collaboration. Media multi-tasking is common in families, and we can see vividly how multi-tasking multiplies quickly as people move themselves and their tasks around their homes. Even in the case of Katherine and Natalie, relatively stable (seated) sites of single tasks can quickly expand into sub-tasks using networked devices.

Prevailing perspectives on multi-tasking caution against it, for how it distracts learners, divides attention (and families), and threatens successful task completion. As a response, this analysis contributed to a different perspective on multi-tasking: media multi-tasking is a significant and pervasive sociotechnical practice, and children engage in many forms of multi-tasking in diverse learning environments. I have suggested a multi-dimensional model for multi-tasking that supports analysis of the multiple tasks, tools, objectives, and people entailed by many everyday learning activities. Understanding how these are multiply configured from multiple perspectives contributes to an expansive view of multi-tasking, widening the lens on what counts as valuable learning arrangements, where and when this takes place, and who decides.

Whereas conventional multi-tasking research finds that adults are better than children at multi-tasking and then uses this to justify cautionary narratives about children's media multi-tasking, I am arguing that adults are important supporters of learning through, to, and despite children's multi-tasking. Because most of us *do* frequently multi-task, it is worth considering how children come to be multi-taskers and to design for this. Simple exposure to multiply mediated learning environments is insufficient for learning to multi-task; Natalie was quite proficient using her laptop but needed her Mom's assistance to learn to multi-task on it. As with children's development of other technological competencies, learning to multi-task benefits from parental support, and is a sociotechnical achievement (Barron et al., 2009).

In the current analysis, I treated home environments as especially conducive to learning while multi-tasking, and I focused on families' designs for multi-tasking. In response to anxious or nostalgic narratives that eschew multi-tasking as a valued learning practice, I believe much can be learned from understanding families' approaches to learning through, to, and despite multi-tasking. At the same time, I do not see these three approaches to multi-tasking as entirely distinct. It was often the case that learning to manage multiple tabs on a screen, for example, also involved learning about whatever content was contained in those windows. Furthermore, families' multi-tasking organized learning such that background processes- like watching TV, monitoring other family member's activities, or uploading a video- intermittently became the central focus of activity. This suggests that task objectives at home are better characterized as moving targets than as categorically "focal" or "background" tasks.

Distinguishing background from foreground is a paradigmatic problem of perspective. What one person (i.e. a parent or teacher) thinks is important to do at any given time may not be valued by children and vice versa. Keying into how tasks serve multiple purposes points to how assigning and distributing tasks over time, space, people, and materials is frequently a powered practice. While school-like versions of attention often emphasize individuals "staying on task," home media ecologies are rich sites for multi-party multi-tasking where the objectives of tasks- and their means of completion- originate from more equitably distributed starting points. My analysis supports the suggestion by Lin and colleagues (2016) that collaborative learning is enhanced by multi-tasking because of the excitement of engaging in more than one task at once, a learning configuration often forbidden in formal learning settings. Instead of barring learners from using multiple media and devices to accomplish tasks in school, designs for learning might incorporate more people, technologies, and tasks in order to simulate how children immerse themselves in dynamic home media ecologies and to stimulate interest-driven learning.

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