SOCIAL MEDIA AT THE BOUNDARIES: SUPPORTING PARENTS IN MANAGING YOUTH'S SOCIAL MEDIA USE

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SOCIAL MEDIA AT THE BOUNDARIES: SUPPORTING PARENTS IN MANAGING YOUTH'S SOCIAL MEDIA USE

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SUMMARY

With millions of youth on the Internet in the U.S., millions of parents are trying to understand what their children are doing and why. Understanding how technology use impacts youth learning, growth, and social development is critical for their health and wellbeing and for the welfare of the family. Yet, balancing parent authority with teen privacy and autonomy is difficult. This dissertation research investigates ways of supporting parents in managing their children's technology and social media use.

This work was inspired by the observation that as kids increasingly use social media ubiquitously and pervasively throughout their daily lives, parents struggle to know how to best raise their children in this environment. My formative study with parents revealed three challenges:

- It is difficult for parents to keep up with changes in social media
- Parents feel that their kids know more about technology than they do
- Parents have neither the time, nor the inclination, to surveil their kids all the time

I designed, implemented, and evaluated an online social network called ParentNet for parents to support them in keeping up with their children's social media use. I found that technical ability predicts parents' ability to effectively parent their kids' social media use. In particular, parents struggled to monitor time, frequency, and location of use. They wanted technical tools to help them monitor use, community-level support to know what other parents did, and policy level decisions that guided their rule-setting for their children.

Youth and parent attitudes towards social media also varied among different social groups. My study of family technology use showed that parenting social media echoes challenges of earlier technologies, but was also affected by new dynamics like mobility and pervasiveness. Parenting is a dynamic process and parents' strategies both shape and are shaped by social media. HCC research has largely focused on putting technology in people's hands to try to improve their lives in some way. My research extends this work through the design and deployment of ParentNet, but also surfaces tensions around technology anxiety and overuse. My work also brings a critical lens to the study of technology in social relationships and suggests opportunities for HCC research to think about how to design against overuse. The contributions of this research are: (1) empirical studies of challenges parents face in managing youth technology use; (2) the design and deployment of a community-based online social network called ParentNet; and (3) limitations and design considerations for deploying technological interventions for different social groups.

CHAPTER I

INTRODUCTION

In February 2012, an angry father posted an eight minute tirade about his daughter on YouTube.

> *"I warned you months ago what would happen if you did something like this on Facebook again. The last time you were grounded... we took away the computer–no cell phone, no Facebook–and I told you if it ever happened again that it would be a lot worse. I'm gonna put a stop to it right now. That right there is your laptop. This right here is my 45... Hope you've enjoyed your little fiasco on Facebook. Hope it was worth all this."*

He concluded the video by shooting eight bullet holes in his daughter's laptop and posting the video to YouTube and her Facebook page. He was responding to a message she posted on Facebook complaining about her parents and home life. In 28 days the video garnered over 31 million views on YouTube. The father went on talk show hosts like Anderson Cooper and the story was covered on Twitter, blogs, and by many of the major news outlets. While extreme parenting is nothing new and certainly not unique to technology [Stearns, 2004], his story clearly resonated with popular sentiment. I believe, as do many people, that he overreacted and did so in a poor way. Yet, I also think his story resonated because many people, and parents in particular, wonder what to think about youth's use of technology.

About 23 million teenagers will get online today in the U.S., hanging out in chat rooms and on social networking sites [Census, 2010, Lenhart, 2010]. 18 million teens have cell phones of their own and 4.5 million of them will text over 100 times by tonight [Lenhart, 2010]. Youth are the most active and eager adopters of social

media [Rideout *et al.*, 2010, Lenhart, 2010] and adolescence is a rich and malleable developmental life stage [Ryan and Lynch, 1989]. To parents of teens, the statistics about youth technology use become a reality when they see their teens tied to their cell phones: texting with an open fridge door, texting immediately out of the shower, or texting a friend immediately after returning home from being out with the same friend. While youth are using technology, over 17 million fathers and mothers will be watching their teens [Census, 2010], wondering what they are doing and why. How many texts is too many? Is it okay to study with chat open and the TV on? Is texting in bed or at the dinner table socially appropriate? How is texting changing communication and relational abilities among teens and broader notions of etiquette within society? Texting is only one instance of broader trends in teens' socializing patterns. Technology has changed the fabric of teens' home and social lives, but it has also dramatically changed the lives of parents. Understanding how technology and social media use impacts teens' learning, growth, and social development is critical for their health and wellbeing and for the welfare of the family.

While some parts of parent-teen interactions have existed for decades and centuries, the mobile and personal nature of technology pushes the boundaries of parenting in new ways. First, parents are often blind to what their children are doing with technology because it is personal and mobile. Second, children's technology use is a distributed problem and requires collaboration among their broader community–teachers, coaches, extended family, and school administrators. From this perspective, "technoparenting"–parenting teens' technology use–can be daunting.

Parents tell me they have struggled to understand what their children are doing with technology and why and how to set rules and boundaries for effective parenting. The issue is complicated. Every generation of new technology (like television and landline telephones) has brought on new trial and error approaches to parenting.

Decades of Dear Abby op-eds depict a droll and often humorous chronology of anxious mothers' struggles with their children's use of the telephone and television. But cultural understanding of how laptops and cell phones influence home life, especially among youth, is still in its infancy. 92% of parents are concerned that children share too much information online and 75% of parents don't think social networking sites do a good job of protecting children's online privacy [CommonSenseMedia, 2010]. As children transition into middle school, parents have to make more decisions about when and how to purchase and incorporate technology such as laptops and mobile phones in their homes [Lenhart, 2010]. Thus, a number of questions arise from a research perspective: how do parents manage their children's social uses of technology? How do parents set rules and keep an eye on technology use? In what ways might be they be supported to do it better?

The rise of this seemingly inexhaustible presence of technology among youth marks a curious turning point in the trajectory of the social life of technology. Early optimism about computers for children spurred ambitious programs to put computers in children' hands [Papert, 1980]. The programs have seen success and continue to grow, but the enthusiasm has been tempered with a sense of distrust and fear about the impact of ubiquitous technology use [Nelson, 2010, Lanier, 2010, Pearse, 2012, Stearns, 2004, Turkle, 2011]. This is perpetuated by pop culture's often prurient interest in topics like online predators, chastising parents for not knowing enough about what their children are doing online, chastising parents for knowing too much of what their children are doing online, sexting, and other sources of moral panic.

Parenting is of course not new, but parents have been more anxious than ever about their children throughout the last century (due to fewer children per family, lower death rates, better health care; see [Stearns, 2004] for a comprehensive coverage of the reasons why). Parents' current fears of technology are perhaps best documented in Nelson's *Parenting out of control: Anxious Parents in Uncertain Times* [Nelson,

2010]. Nelson is concerned that parents are already over vigilant childrearers today and the influx of available technology enables them to monitor children excessively, through GPS, baby monitors, or keylogging software. In today's era of Facebook, Twitter, FourSquare, texting, and general hyperconnectivity, there has been, more than ever, a massive cultural shift in how we look at technology [Turkle, 2011, Lanier, 2010, Carr, 2010, Fullerton, 2010, Hallnäs and Redström, 2001, Sengers, 2011, Nelson, 2010]. This dissertation research documents an investigation into this technological perspective through the lens of parents of youth. Through a series of studies, I examined how parents currently manage technology in their families' lives,

1.1 Overview of Dissertation Work

I conducted a formative interview study with parents to examine parenting challenges with respect to teens' technology use (Chapter 4). I used an activity theory framework [Kuutti and Nardi, 1996] to explain how parents use rules, tools, and division of labor to actively parent their children' technology use. They set rules about time of day and location that technology could be used in the home, and they use technical and social tools like viewing Internet history and requiring password sharing to monitor use. They also leveraged their broader community, including schools, other parents, and extended family members, to help keep up with and keep an eye on what their children are doing. These results introduced new social and technical avenues for exploring how to support parents in managing their children's social media use.

Through a three-year partnership with a local school, I deployed a parent network intervention (Chapter 5) and evaluted effectiveness (Chapter 6). I first ran a pilot study in which 6th grade parents were invited to join an online social network for parents. I organized chat help-sessions, provided resources, and observed attendance and participation. Building off this experiment, I redesigned the parent network for 6-8th grade parents. I administered an online survey to the first 100 middle

school parents who joined the parent network which asked parents about their own technical abilities and their children's' technical abilities. At the end of the school year, I conducted focus groups with parents. These were structured to complement the network and survey, with a focus on rich descriptions and collective brainstorming about social media management at home.

The results of this research revealed tensions around circumvention, monitoring, keeping up, and disconnecting. With respect to time, parents were concerned about the amount of time and times of day that their children were using social media, and that they did not themselves have the time to keep up with the social media that their children were using. Parents liked having a parent network with relevant resources all in one place; yet, perhaps ironically, the network introduced another activity that they did not have time for. With respect to technical ability, parents acknowledged that their children knew more than they did. Rules were easy to articulate but hard to enforce.

Whether or not teens are actually digital experts is up for debate [Hargittai, 2010], but teens are often perceived as experts [Kiesler *et al.*, 2000]. Parents tried to set rules and boundaries but these were circumvented by their children in a seemingly never-ending game of digital cat and mouse. In the home, parents designated "technology rooms" where technology could be used that aligned with parents' existing daily routines (in the kitchen so a parent could watch while cooking dinner, or in the hallway so parents could see while walking back and forth). They also leveraged community resources like older siblings, other parents, and the school in distributing monitoring and oversight across boundaries. While some approaches were effective, most left parents feeling like their children had the upper hand. This work contributes a novel online school-based parent intervention and an understanding of the day-to-day constraints faced by parents.

Finally, I wanted to consider whether an intervention like ParentNet would be

useful or effective among a different social group than that that of my deployment. In particular, access to technology among low income demographics has increased; yet, gaps in participation still exist. There are few theories or design principles available to explain how this population identifies with technology and the social and structural forces that impact their technology use. In an exploratory study, I interviewed low income parents in South Atlanta to understand how they incorporate technology into their homes and what kinds of rules they set and challenges they faced. I found that social structure both reflected and reinforced technology use at home. Specifically, sharing of devices at home, individual responsibility and purchasing power, and lack of oversight within single parent families perpetuated the digital participation gap in distinct ways (Chapter 7).

1.2 Thesis Statement and Research Questions

The central thesis of this dissertation is that parents can effectively manage their children's technology use, but their ability to do so will depend on the resources, technical ability and engagement, and social structure available to them.

To investigate this thesis, the guiding question is how do parents manage their children's technology use and how can they be supported to do it better? This question is divided into four research questions which I present here.

RQ 1: What strategies do parents use to manage their children's use of technology? RQ 1a: What are the challenges and opportunities they face in doing so? To answer RQ 1, I conducted an interview study with 16 parents in the Atlanta area. I used a thematic analysis approach to develop categories around parenting and technology. The results of that work are reported in Chapter 4.

RQ 2: How much do parents feel they know about technology and how much do they feel their children know? RQ 2a: What questions

do they ask and what rules do they set with respect to managing their children' technology use? I complemented the qualitative results from RQ 1 with a survey of 52 parents' attitudes towards technology and self-reports of their technical competency. That data is reported in Chapter 4.

RQ 3: What characteristics affect social media adoption or rejection among parents? RQ 3a: To what extent does a community-based online intervention positively or negatively affect attitudes? To explore RQ3, I designed and deployed an online social network for parents called ParentNet to help them keep up with changes in technology. I describe participants, site use, and successes and failures of the site. This work is described in Chapters 5 and 6.

RQ 4: In what ways do parenting strategies and challenges vary among different social groups; specifically, low income and middle and upper income parents? The studies reported in Chapters 4-6 were with participants who were mostly middle and upper income. To explore RQ4, I conducted an interview study with 18 low income parents in the Atlanta area. In Chapter 7 describe parenting across different family structures and classes.

These research questions and their location in the document are presented in Table 1.2 and an overview of the work completed for this dissertation can be found in Table 1.3.

1.3 Overview of this Document

This dissertation is organized as follows. Chapter 3 describes my approach to research from a theoretical and methodological perspective. I describe my approach to data colletion and analysis of that data drawing from social science and human-centered

Table 1: Research Questions.

Research Question	**Location**
RQ 1: What strategies do parents use to manage their children's use of technology? RQ 1a: What are the challenges and opportunities they face in doing so?	see Chapter 4
RQ 2: How much do parents feel they know about technology and how much do they feel their children know? RQ 2a: What questions do they ask and what rules do they set with respect to managing their children' technology use?	see Chapter 4
RQ 3: What characteristics affect social media adoption or rejection among parents? RQ 3a: To what extent does a community-based online intervention positively or negatively affect attitudes?	see Chapter 5-6
RQ 4: In what ways do parenting strategies and challenges vary among different social groups; specifically, low income and middle and upper income parents?	see Chapter 7

computing disciplines. In Chapter 2, I describe prior work on youths' engagement with technology and parents' attitudes towards technology. I also consider parenting more broadly from a theoretical and historical perspective as a lens through which to view my research. In Chapter 3, I describe my approach to data collection and analysis and frame it in a human-centered computing approach. In Chapter 4, I present a formative qualitative study of challenges in parenting youths' technology use from parents' perspectives. In Chapter 4, I also describe rules parents set and their technical abilities. Chapter 5 presents ParentNet, a community-based online intervention to support parents in learning about and keeping up with changes in technology. I describe its design and deployment among middle school parents and present the evaluation in Chapter 6. In Chapter 7, I compare parenting among middle and upper income parents to that of low income parents as it relates to technology use in the home. Finally, in Chapter 8, I conclude with reflections on this work and future directions.

Table 2: Work completed for dissertation.

Study	**Description**	**Data**	**Participants**
Parent Formative Study	Interviewed parents to understand challenges and opportunities in managing youths' technology use	Interview transcripts, Thematic analysis approach, activity theory framework	16 middle-upper class parents (with at least 1 child in 6-10th grade)
Parent Pre-Survey	Measure parents' attitudes and confidence around technology	Attitude measures	52 middle-upper class parents (with at least 1 child in 6th-9th grade)
ParentNet pilot	Pilot design online social network for middle school parents	Participant observation and participant feedback	50 middle-upper class parents (with at least 1 child in 6th grade)
ParentNet deployment	Iterative design and full deployment	Log file analysis, Online communication analysis, participant observation	140 middle-upper class parents (with at least 1 child in 6th-9th grade), 4 high school students, school administrators, school IT
Parent Post-Focus Groups	Evaluate effectiveness of ParentNet, Discuss technology use at home	Focus groups	28 middle-upper class parents (with at least 1 child in 6th-9th grade)
Interviews with low income parents	Interviewed low income parents to understand parenting differences as they relate to class	Interview transcripts	18 low income parents (with at least 1 child in 4th-10th grade)

CHAPTER II

RELATED WORK: PARENTING STYLES AND BOUNDARY SETTING

In this section I describe related work drawing from Sociology, Family Studies, and Psychology to describe parenting approaches and family technology use. I first describe theories about parenting styles and what makes effective parenting. I then discuss technology use in home and school contexts. Finally, I consider theories about why parents are anxious about technology and societal perspectives on technology through a broader lens. I use the words "child" and "children" to refer either to family relationships (the child of the parent) or to indicate someone who is not an adult. The words "youth" and "teen" are both used in the document and indicate roughly ages 8-17.

2.1 Parenting Styles

In this section I describe parenting theories that have were first presented in the 1960's and have been, by most accounts, supported by numerous studies in the past 50 years. Theories about parenting are complicated, contextual, and often controversial. Thus, what I describe here should be considered local and contextual to Western living in the late 20th and early 21st century. I consider the evidence that supports theories about parenting styles and I also question their usefulness in the context of parenting technology use.

> *"I have limits on her phone. She just can't help herself. If the phone is there, she can't stop doing it. In the morning it buzzes with a text message from a friend. During exams we'll try to keep the phone out of her room*

and it's a constant battle. So I've put time limits and number limits and I've basically given her the latitude to say as long as your school work's okay, it's up to you." -Parent

"I'm not sure that he knows I've searched his history. I also feel that some of those things of parenting, you don't have to tell your kids everything. You're not friends with them; I love them but it's my responsibility to raise them as safe, healthy, and independent adults." -Parent

Attitudes towards parenting began to shift in the early to mid-1900s up to the 1960's [Pollock, 1983, Stewart and Bond, 2002, Nelson, 2010]. Before that change, parents often sought advice from elders in their community, like their own parents or elders at church. They also looked to clergyman for advice on child-rearing. As attitudes and beliefs began to shift, parents began to look to a professional class of experts like doctors and psychologists for parenting advice. With this change came an apparent increase in fear and anxiety among parents, even in cases where there wasn't strong evidence proving correlation. For example, it has been suggested that fears about not breastfeeding, posture, neighborhoods exposure to germs, food choices, and a number of other modern features of everyday life related to advice that was coming from this new professional class of experts [Nelson, 2010, Stearns, 2004]. At the same time that this culture of anxiuos parenting grew, there was also a growing movement towards children's rights and encouraging children to develop and express their own feelings. Taken together, parents faced an often confusing range of desires to protect their children from disease and sickness while letting them roam freely to explore and learn.

These debates have raged for centuries and continue to today. In 2012, the notion of a "tiger mother," a mother who sets high expectations and rules with little or

no flexibility or freedom in her children's lives, has received extensive criticism from mainstream culture in the U.S. [Chua, 2011]. Consider an alternative recent case study, the French approach to parenting as described by a middle-upper class American woman bringing up her children in Paris [Druckerman, 2012]. In this culture, children are raised with strict rules and control of emotions, though they're loved and cared for. As a result, parents are, or appear to be, more relaxed and happy.

Despite the complexity of parenting, Diana Baumrind's theories about parenting styles stemming from the 1960's have become a useful framework to think through approaches to parenting across demographics and cultures [Baumrind, 1967, 1966, 1971, 1991, 1978]. Baumrind's labels were presented in the service of examining parenting attitudes and approaches. They have withstood decades of research and popular culture largely because they are easily packaged, and can be examined through various forms of observation and interview based research. Though her theories have been contested, which I'll return to later, they have been generally accepted within the psychology community and in popular culture. Baumrind conducted her research by locating children who had qualities deemed as desirable then looking for elements of parenting that might have encouraged these qualities. By qualities deemed desirable, she and other researchers focused on things like maturity, independence, self-control, curiosity, friendliness, and motivation. She identified two important dimensions: responsiveness and demandingness. Responsiveness refers to the extent to which parents are warm and supportive with their children and responsive to children's requests. Demandingness refers to the extent to which parents control their children and set and expect high expectations for them.

Baumrind proposed three styles of parenting (the fourth was later added by Maccoby and Martin). Together, they distinguish parenting styles into four constructs: *authoritarian*, *permissive*, *uninvolved*, and *authoritative* [Baumrind, 1966, Maccoby and Martin, 1983]. Authoritarian parents are highly demanding, but not responsive.

They expect their rules to be obeyed without reason or explanation and are highly controlling. They expect their orders to be obeyed and do not encourage discussion or disagreement. In contrast, permissive parents are responsive but not demanding. They are lenient and avoid confrontation and are generally indulgent with their children. They rarely set limits and they allow their children to set their own rules. Uninvolved parents are neither demanding nor responsive. They are detached, dismissive, or hands-off. In extreme cases, they may behave in ways that are neglectful and negligent. Finally, authoritative parents are both demanding and responsive. They set clear standards and limits but explain their reasons and motives during punishment. They set limits and rely on trial and error and consequences to guide children in learning why rules are important. They are firm with their children but are open to reason and do so in a way deemed to be kind and loving. They set high standards and encourage increasing independence in their children.

Authoritative parenting is the recommended style of parenting by child-rearing experts. Studies have shown this over and over: children with authoritative parents tend to be happy, socially adjusted [Clarke-Stewart, 1998], successful academically [Steinberg et al., 1992a,b], more socially competent [Fagan, 2000], and have higher self-esteem [Maccoby, 1992]. Authoritative parenting has been associated with low levels of pscyhopathology among children [Reiss et al., 1995] while authoritarian and permissive styles have been associated with increased levels of pscyhopathology [Shelton et al., 1996]. Authoritative parenting has also been associated with weight. Based on data from 872 children and their parents, researchers found that children of authoritarian mothers were almost five times as likely to be overweight as those of authoritative mothers [Rhee et al., 2006]. Children with permissive or uninvolved parents were more than three times as likely to be overweight.

In the context of a simple example of rule setting around an 11-year old child who asks a parent if he can join Facebook, parenting styles might go as follows.

- Authoritarian parent: Gets angry and responds that the child cannot join any social networking sites until they say he can.
- Permissive parent: Says it's fine by them if the child joins Facebook.
- Uninvolved parent: Says they don't care if the child joins Facebook or not.
- Authoritative parent: Asks what the child would like to do on Facebook and agrees to work with the child to use it in appropriate ways.

2.1.1 Weaknesses of the Parenting Styles Approach

Scholars debate about where parenting styles are useful and where they fall short. In the former camp, Stewart and Bond [2002] has argued that parenting dimensions are universal and are good and useful indicators of parenting behaviors in different social groups precisely because cultures differ. In other words, parenting styles describe naturally occurring parenting behaviors across all social groups. In contrast, other researchers have questioned the use parenting styles as a useful construct and instead emphasize the dimensions of demandingness, responsiveness (or warmth), and autonomy granting as better indicators of positive parenting [Barber, 1996, Darling and Steinberg, 1993]. Thus, there is a tension between two beliefs: parenting styles are universal and useful versus parenting styles are useful only for a particular demographic and do a disservice to other demographics.

Arguments can be made for both sides of this. The parenting styles framework is useful for trying to put a finger on complex behaviors and developing labels to understand certain kinds of choices and decisions parents make. However, there are problems with a one-size-fits-all kind of approach in this context and I want to acknowledge these issues here. There are many ways these styles become complicated and problematic.

1. First, there is a question of how much and what kind of authority a parents

should have over their child (and reasonable people disagree strongly on this issue).

2. Second, these parenting styles become deeply complicated when parents are negligent, malicious, or well-intentioned but have deeply opposing views to their child (e.g. a staunch Christian parent who believes homosexuality is a sin and a child who is questioning his sexuality).

3. Third, the nature of the child and how well he responds to different kinds of parenting should dictate what approaches parents may choose to use. As any parent of more than one child would affirm, no single solution fits all. For example, one criticism is that the emphasis on authoritative parenting may lead to children being motivated by external rewards rather than their own internal motivations [Gottfried et al., 1994]. In other words, the emphasis on parenting needs to be on cultivating motivated children rather than demanding certain kinds of behavior.

4. Finally, a number of researchers have suggested that the four parenting styles fall apart in contexts other than white, American families. The next section addresses this topic.

2.1.2 Parenting Styles and Diversity

The problem with the theories about parenting styles (and indeed, many of the theories about parenting that have emerged over time) is they are largely based on research conducted among a majority culture of White, middle-class Americans. For example, in the parenting styles and weight study mentioned earlier, the majority of participants were White and the authors note that authoritarian parenting has been correlated with race in other studies [Radziszewska et al., 1996, Dornbusch et al., 1987] which might also be related to healthy and unhealthy behaviors. There is also

conflicting data about whether authoritative parenting is in fact most predictive of positive outcomes in the child among different social groups. Some claim authoritative parenting is the better style [Carlson et al., 2000] but others argue against this claim and say that authoritarian or permissive styles could be better in certain contexts [Lindahl and Malik, 1999, Gottfried et al., 1994, Chao, 1994]. Thus, it isn't known to what extent parenting style results are as robust among other social groups beyond that demographic. For example, some researchers have described Latino parents as permissive [Julian et al., 1994] while others have described them as authoritarian [Darling and Steinberg, 1993]. Rodriguez et al. [Rodriguez et al., 2009] examined parenting styles among 50 first-generation Latino parents and their children but added a third dimension: autonomy granting. They found that the four traditional parenting categories were insufficient among the Latino families and instead proposed eight categories, the most frequently appearing of which was "protective." They also found that expectations were different for male versus female children. Granted, their sampling was also limited, comprised of Latino, rural, predominantly Mexican-origin, and low income demographics. It is worth noting that [Rodriguez et al., 2009] also contributed a new P-SOS (Parenting Style Observation Rating Scale) that they posed as a contribution for future parenting styles researchers to use. They acknowledged that it is not validated but it is a starting point. I did not use this scale because it's intended for parent-child observation settings and does not handle online communication.

In a larger study, Radziszewska et al.'s survey of 3,993 15-year-old White, Hispanic, African-American, and Asian adolescents suggests that African American boys with uninvolved parents had a higher depression score whereas African American girls had the lowest depression scores [Radziszewska et al., 1996]. Among children of authoritarian parents, Asian females had the highest average depression score and African-American females had the lowest. The authors are careful to note that a

larger sample size is needed but highlight the intersection of race and gender as potential complicators to the usefulness of parenting styles. Finally, Chao's study of Asian parents suggests that they are autoritarian but that the parenting style should factor in the concept of "training" which would explain why children of authoritarian-like Chinese parents still often succeed in school. Each of these studies highlights the potentially problematic nature of parenting styles in different cultures.

More broadly, parenting is contextual to an individual child's personality and needs and scholars have questioned the usefulness of a framework that does not take into account the nature of the child in the parenting style. For example, Lewis [1981] questioned whether the positive outcomes associated with positive parenting were a result of the right combination of demandingness and responsiveness or whether they were due to the existence of a warm and caring parent-child relationship. If parent and child have a good relationship, with few conflicts, permissive parenting might look a lot like authoritative parenting.

Indeed, one reason tensions in parent-teen relationships develop is because they disagree about how much and what kinds of autonomy teens should have and how much authority parents should have Smetana and Asquith [1994]. Effective parenting requires a balance between parents' authority and children's agency in their own lives. The problem with erring on the side of too much authority is that such over-restriction can lead to psychological reactance, in which children feel their behavior is being threatened and respond in the opposite direction or by circumventing the restriction [Brehm, 1981]. The nature of these tensions varies with what is being disagreed on. Parenting authority can be grouped into four domains [Nucci and Lee, 1993, Smetana, 1988]:

- Moral (don't hit, do share)
- Prudential (don't run with scissors)

- Social conventions (be polite to elders)
- Personal (privacy, friendships, music, activities, clothing, and self-expression)

The personal domain is where the majority of conflicts between children and parents occur [Smetana and Asquith, 1994]. Teens might not argue with moral or prudential rules, like not stealing and not running in the street, but they do argue with personal rules [Nucci and Lee, 1993]. Conflicts arise when they disagree on what constitutes personal business, such as a girl who wants to wear a short skirt. The girl wants discretion and autonomy in choosing what to wear; the parent argues that this is part of family and social conventions and not up for discussion. Ling described the social impact of the mobile phone on power relations as teens were "emancipated" from their parents' authority [Ling, 2004]. Conflict is routine in adolescence, and teen relationships with peers and parents can be inconsistent and unstable.

2.2 Youth Technology Use

These challenges are altered and sometimes magnified in the context of technology use among youth. Teens are early adopters and heavy users of technology, especially in developed countries where access has grown rapidly in recent years. Teens are chatting, instant messaging, Facebooking, YouTubing, and gaming [Grinter *et al.*, 2006, Lenhart *et al.*, 2010, Livingstone and Helsper, 2008]. For example, 75% of 12-17 year-olds own a cell phone in the U.S. and 72% of them are text messagers (2010) [Lenhart, 2010]. Teens in the U.S. send or receive an average of 3,339 texts per month [Nielsen, 2010] whereas 10 years ago they sent two orders of magnitude fewer per month (or 5-10 per day) [Grinter and Eldridge, 2001]. The frequency of texting has overtaken that of every other common form of interaction with their friends (such as calling, talking face to face, social networking site, instant messaging, or email) [Lenhart, 2010]. Teens have developed social currencies like "gifting" calls,

maintaining a large number of store numbers in the address book, and style of use and placement on the body [Ling and Yttri, 2005].

Intense access and use isn't limited to cell phones. Grinter's early study of teen IM use described two modes of usage: continuous-sporadic and discrete-intensive [Grinter *et al.*, 2006]. The continuous-sporadic mode involved leaving IM on at all times but only using it periodically when the teen was in front of the computer. The discrete-intensive mode involved making time for IM and using it intensely during those times. This was often related to shared computer access and phonelines where teens had to acquire temporary control over access. By 2009, 59% of teens in the U.S. had their own desktop or laptop computer [Lenhart *et al.*, 2008] and over half of 12 year olds had a cell phone with the numbers rising to over 85% of 16 year olds. Similar adoption patterns are seen in many regions around the world. 43% of U.S. teens in 2010 say the top reason for getting a cell phone is text messaging, whereas in 2008, they reported the main reason for getting a cell phone was safety [Nielsen, 2010]. Ling's study of the social impact of the mobile phone on power relations found that teens were "emancipated" from their parents' authority through mobile phone access and use [Ling, 2004].

Whether or not youth are actually digital experts is up for debate, but teens are often perceived as experts [Hargittai, 2010]. The"teen guru" is characterized as a source of technical help and advice that flows from teen to adult [Kiesler *et al.*, 2000]. For parents, there is a tension between their desire to have a child who develops expertise in computing and a child who uses the computer too much. This creates tensions in power and authority among parents and teens. In Israel, Mesch reported characteristics of intergenerational conflicts focusing on teens at home, including issues of privacy [Mesch, 2006a]. He showed that adolescent-parent conflicts over Internet use related to the perception that the adolescent was a computer expert. Egelman et al. examined shared home computers among families, and noted that family members

only switch user profiles when some amount of privacy is needed [Egelman *et al.*, 2008]. Notably, many conflicts arose because at the time families had only one computer and one phone line. Kiesler et al. conclude with a call for more research: "What changes occur in generational dynamics when children have more knowledge in some domains than their parents? How does the acquisition of technical expertise differentiate a person from that person's peers and from other family members?" These questions remain largely unanswered and motivate this dissertation work. What we do know about parenting Internet use is that existing approaches are more successful when they focus on technology mediation and Internet risk prevention.

In the UK, Livingstone and Helsper [Livingstone and Helsper, 2008] found that parents preferred social forms of mediation (e.g. discussions and co-viewing) over technological ones (e.g. monitors and filtering). Further, technological strategies were not effective in reducing online risks (e.g. porn, violence, or privacy), whereas parental restrictions were effective at reducing these risks. Byrne [Byrne and Lee, 2011] showed that communicative style and parenting style predicted disagreements between parents and children about Internet use. Children who felt it was hard to talk to their parents about Internet use tended to disagree more with their parents about Internet risk prevention strategies. Parents and children disagreed on a number of other levels as well. Parents were less supportive of legal consequences (like being arrested or suspended from school), whereas children tended to approve of legal consequences. Children were less enthusiastic about co-viewing and parental access to their favorite websites via passwords or friending, but parents supported these approaches. However, both parents and children agreed that empowering children is beneficial for the child.

2.3 Domestication of Technology

Social media has permeated everyday life beyond just youth's use, promoting cultural reflection about its impact on our relationships, productivity, and health. This topic is especially salient for young children and teenagers in home and school life, the two places where they spend the majority of their waking hours. Domestication is a framework that looks to describe ways that technology is adopted in the home and "finds a place in people's life" [Haddon, 2003]. A primary argument in domestication theory is that technology innovation is a process, not an event [Haddon, 2003, Silverstone and Haddon, 1996]. It argues that discussions about technological innovation should not only include the production of technology, but also the social, cultural, economic, political, and individuals involved in the process should also be considered. Domestication theories closely align with related ideas about the social construction of technology and social shaping of technology [Bijker *et al.*, 1987].

The process through which technology is brought into the home and used in everyday life in domestication theory consists of four phases: appropriation, objectification, incorporation, and conversion [Silverstone and Hirsch, 1994]. The first phase, appropriation, describes the transition in which the object moves from a commodity to a possession in the home. The object gains significance as it moves into the home. This might also include household discussions and negotiations about whether or not to acquire a technology [Haddon, 2006]. The second phase, objectification, occurs when the object takes its place within the home. It is used and displayed in the home and begins to reconstruct the environment in which it is placed, both for the family, and to display external context, such as status. The desire to control image and self-presentation may also explain nonadoption of some technologies. The third phase, incorporation, describes the movement of the object into everyday life. The object's level of functionality depends on how it is incorporated into daily life. Adjustments to routines also vary with its level of functionality. Objects are incorporated in ways

that are relevant and meaningful within people's own lives, such that the technologies reinforce and extend existing patterns and practices. Location of use in the home becomes part of the negotiation. The last phase, conversion, examines the broader meaning that the object takes on in public spaces within and outside of the home.

Research has examined the domestication of a number of different kinds of technology, such as the television and the computer [Haddon, 2006, Morrison and Krugman, 2001, Silverstone and Haddon, 1996] as well as "domestic technologies" like dishwashers and vacuum cleaners [Cowan, 1976]. Recent studies have examined the adoption of laptop computers and mobile phones in home life (e.g. [Haddon, 2003, Ling, 2004]).

My dissertation works draws from these studies of technology in the home and examines parenting decisions particularly focused around middle school children's technology use. Middle school is a transitional period in children's lives, and in the lives of their parents [Wentzel, 1998, Ryan and Lynch, 1989]. Developmental changes exist socially, physically, and emotionally [Damon and Lerner, 2006]. Changes also exist around technological consumerism–middle school is when children's technology use and ownership spikes rapidly upwards in the U.S. [Lenhart, 2010]. One of the most striking and potent trends is the increasingly young age that teens get technology, what I have called "middle school burst." In 2005, most teens got a cell phone at age 15-16; in 2010, most teens got a cell phone at age 11-12 [Lenhart, 2010], right when they were entering their middle school years.

Little is known about technology acquisition and use at this age, yet middle school (at the time of this writing in 2012) is when most children begin to get their own devices and is also when the bulk of social and development changes occur as they transition into adolescence [Ryan and Lynch, 1989]. Most work on family communication through technology in HCI and HCC has focused on systems to support family connectedness (see [Tee, 2009, Judge and Neustaedter, 2010] for example). Odum et al. report tensions around communication, coordination, negotiation, and identity

in divorced families and consider ways of designing for these alternative families and their children [Odom *et al.*, 2010]. Rode's study presented tensions around safety and security of children's use of technology at home [Rode, 2009]. Brush and Inkpen included teens in their study of technology sharing in public and private spaces in homes [Brush and Inkpen, 2007]. They found that parents expressed concern over controlling their children's computer and Internet use and took actions to limit time, kinds of use, and location. Judge et al. similarly found that autonomy-the control to turn a "family window" on or off-was an important part of a home media space [Judge and Neustaedter, 2010]. Many existing studies of youth's use of technology have focused on youth use broadly but have not focused specifically on middle school years. My dissertation builds on these broader studies and explores parents' rule-setting during the transitional middle school years.

2.3.1 Technology in the Home

The domestication of the social web into teens' everyday lives echoes the growing pains of every new media that has come before it. Some of these patterns mirror those of earlier generations; for others, existing routines give way to new ones. In the 1960's, teens' communication through the home telephone disrupted family routines and rituals. For example, with the birth of the television, families had to make decisions about whether to incorporate television into the dinner time routine, in the same way they do with mobile phones now (and continue to do with television). Morley's depiction of "family television" described ways that viewing is "situated firmly within the politics of the living room" [Morley, 1986]. He showed that television watching often reflected existing power relationships in the home, such as parents' power over children, or gendered dynamics in program choice. The early television facilitated a kind of "family hearth" in which the family gathered around the television together [Morley, 1986]. This behavior more recently has been aptly described as a "digital

hearth" in which spaces where collective engagement with technology occurs, such as Wii or console games. This shifts the way the family comes together around technology use [Eastin *et al.*, 2006].

In contrast to the placed-based nature of watching television or playing video games in the family room, much of youth's face-to-face social life has traditionally occurred outside the home. But mobile phone and Internet access in the bedroom mean a new genre of youth hanging out can take place in the bedroom. Bedrooms have long been a point of negotiation between parents and children [Larson, 1995]. When the notion of a second landline emerged, teens wanted one to talk in their bedroom privately; when televisions became cheap enough to buy more than one, teens wanted a television in their room [Bovill and Livingstone, 2001]. Yet, differences exist in mobile technologies. Parents could answer the shared landline phone which was located in the kitchen or a common room. Thus, they knew who was calling and how long their child was talking. Mobile phones have eroded some of this parental control. Teens' communication through the social web disrupts family routines and rituals. For example, teens are woken up in the middle of the night because of their mobile phones and older teens are woken twice as often as younger teens [Van Den Bulck, 2004].

Families have long tried to set boundaries around technology use in the home. Despite this, studies of home wireless use have showed that people have few boundaries in use of their devices. Mateas et al. described clusters in the home such as the "work space" and "private space" that indicate general areas where work is done or where privacy is maintained [Mesch, 2006b, Mateas *et al.*, 1996]. The challenge for families is that Internet access allows youth to connect to their friends while remaining at home, a practice they could not do previously. Parents try to set rules around this new behavior, but my research has suggested that they don't always have a clear goal of what the rules are or more importantly, why they need to exist. For many

parents, youth are living out their social lives online but they are still adolescents in the physical world, living at home and being raised by their parents.

2.3.1.1 Technology in Schools

While I am not focused on technology use in schools in this dissertation, technology in schools was very much something that came up in my coversations with teachers, parents, and administrators. The role of technology in the school setting was clearly complicated, and I observed the community wrestling with ongoing challenges around cell phone use in the classroom, bullying, and pedagogy. Researchers children and Internet use in the 1990's focused largely on the computer's capacity for promoting learning [Bruckman, 1999, Druin *et al.*, 1997]. This research agenda continues as more recent investments from large foundations like Pew, Kaiser, and MacArthur have spurred a community of researchers around the study of "digital youth" more broadly [Ito, 2009, Lenhart *et al.*, 2010, Rideout *et al.*, 2010].

Indeed, technology in schools has had an interesting history since the push for computers in classrooms in the 1980s. For example, the year 2002 marked the beginning of an ambitious project. In Maine, 17,000 students in the 7th grade would receive Apple laptops that they would use in school and could also take home after school and during vacations. From the beginning of the program, class attendance began to increase and detentions dropped. Of the early participants, over 70% reporting being more engaged and involved at school [Silvernail and Lane, 2004]. Maine signed an initial four-year contract for over $37 million dollars and the program was later expanded to 8th graders and to one-third of public high schools in Maine. It was used as a model for other programs around the U.S. and the world. A side effect of one-to-one laptop programs was that students started bringing school laptops home with them. Technology use at home was growing anyway and school laptops added to the richness and complexity of the home media landscape.

Yet, technology can be disruptive to existing home and school routines. In schools that ban mobile phones, 65% of high school students still bring their mobile phone to school, and 43% of these teens say they text in class one or more times a day [CommonSenseMedia, 2009]. These patterns indicate the difficulties in balancing technology use in schools for administrators and teachers. The desire to better understand technology was one of the reasons the school I worked at was interested and engaged in my dissertation topic. Their support and participation was essential in conducting my research.

The concerns that the school community have around technology follow a long tradition of concerns about technology in society. In the next section, I will consider these issues and then tie them back to the context of parenting.

2.4 Technology Anxieties and Fears

In 1984, the philosopher Albert Borgmann introduced the concept *device paradigm* to describe the way technological devices are perceived and consumed in modern society. In his book, *Technology and the Character of Contemporary Life*, he takes a distinctly dystopian perspective on the hidden power that technology can impose over our lives [Borgmann, 1987]. Borgmann fears that with the benefits of speed, efficiency, and commoditization will come loss of control, meaning, and quality of life. Such concerns have been echoed and magnified today in a new groundswell of cultural reflection. In today's era of Facebook, Twitter, FourSquare, texting, and general hyperconnectivity, there has been, more than ever, a massive cultural shift in how we look at technology.

Like with current technologies, we have observed a similar rejection-acceptance cycle in response to a range of technologies like the radio, television, and Internet. Prominent researchers, scholars, authors, and citizens have reflected extensively on technology and life. For example, Sherry Turkle questions if we are becoming too emotionally attached to our devices and will lose our ability to maintain relationships

with people [Turkle, 2011].

"For young people in all of these circumstances, computers and mobile devices offer communities when families are absent. In this context, it is not surprising to find troubling patterns of conection and disconnection: teenagers who will only "speak" online, who rigorously avoid face-to-face encounters, who are in text contact with their parents fifteen or twenty times a day, who deem even a telephone call "too much" exposure and say that they will "text, not talk."" [Turkle, 2011].

Nicholas Carr and Jaron Lanier have described the sobering affect that the Internet has had on people's ability to concentrate, and on culture, creativity, and judgment [Carr, 2010, Lanier, 2010]. From Carr, *"The computer screen bulldozes our doubts with its bounties and conveniences. It is so much our servant that it would seem churlish to notice that it is also our master"* [Carr, 2010]. Yet, even among these testimonies and many others, there is a prevailing sense that we have the power to control technology more than it controls us. Pico Iyer's "The Joy of Quiet" is an account of such control [Iyer, 2011]. He describes vacations where customers pay partly for the privilege of not having a TV, and paints the portrait of a young family stepping away from the screen to take a walk in the hills. Such pastoral depictions are familiar antidotes to the steady stream of technology in daily life (see the manichean debate in [Wellman, 1999]). Howard Rheingold, perhaps one of the strongest supporters of online relationships, continues to emphasize that engagement with technology requires mindfulness and reflection.

"While still a devotee, I'm now aware and wary of the rat holes, hidden biases, unwholesome interchanges, and delusions of grandeur that can plague online culture. It is possible, I have long believed, to temper one's ardor with critical thinking, and that it is not healthy to have to choose only between being a complete supporter and a total skeptic" [Rheingold, 2012].

Despite the array of foreboding tones in recent narratives, most scholars–even

skeptics–ultimately agree that people have agency and control over their technology.

"Thus, we seek to expand our control and thoughts through technology rather than letting it control us. Technologies are not merely aids to human activity, but also powerful forces acting to reshape that activity and its meaning"" [Carr, 2010].

Turkle says that what is important is not what computers are capable of doing today or in the future. Instead she is focused on how people will engage with these technologies, or as Carr articulated, how we expand our power and control over our circumstances. This tension in power and control over technology converges with a parallel tension that parents experience over their children.

2.4.1 Anxious Parenting

The convergence of this culture of uncertainty around technology [Borgmann, 1987, Nelson, 2010, Turkle, 2011, Carr, 2010, Lanier, 2010] with a culture of anxious parenting in the past century [Stearns, 2004] has led to a complex landscape where parents are both eager advocates of technology in their children's lives but simultaneously fearful of its effects. Stearns (2004) attributes anxious parenting to a greater sense of vulnerability and frailty in the past century. "Some of our most striking practices, from grade inflation to worries about children's boredom, result from the intersection of beliefs in vulnerability and the influence of wider social institutions" Stearns [2004]. Evidence of anxious parenting emerged in the early 1900s, when child-rearing manuals appeared in mainstream venues (e.g. Parenting Magazine). Where 19th century parenting drew on moral common sense, usually clergyman writing in a nondenominational (but Protestant) tone, 20th century parenting drew on professional expertise from psychology and medicine [Stearns, 2004]. One of the products of this change in the tide was parents being led to feel concerns where they had not existed so strongly before. Locke furthered the notion that an ignorant or undisciplined child represents the failure of adults (parents, schools, government) not the child [Postman, 1994]. "It

was hard to avoid an anxious monitoring of children's health given the intolerable burdens of error" [Stearns, 2004]. Thoughts like "what did I do wrong?" and "do you know where your child is?" took a firm hold from the 1970's onwards. Scholars debate the causes of this sentiment, but it has been attribute to lower birth rate (and lower death rate of babies), children as economic responsibilities rather than resources, and improvements in medicine. Some historians have also argued that parents' bombardment by expert opinion in popular books as well as in school programs and newspaper columns, undermined parental confidence [Stearns, 2004].

This culture of anxious parenting is transferred and for some parents, magnified, in the technological realm. Nelson (2010) describes a tension in parents' attitudes towards privacy and surveillance with respect to their children [Nelson, 2010]. Specifically, parents, especially middle and upper class parents, suggest they are morally opposed to spying on their children through technological means (drug testing, GPS tracking, spyware), but also acknowledge they would do so if they felt their child was in trouble. Thus, privacy is a valued right for youth, but if children might be in trouble, the question of whether or not they are entitled to privacy becomes more complicated.

Nelson focuses on differences in privacy values among working class versus middle class or upper class (what she calls "professional middle class") parents. She characterizes upper class parents as having the style "parenting out of control" and working class parents as "parenting with limits." By this, she means that upper class parents are focused on education, passion, engagement, choices, and negotiation with their children. In contrast, working class parents are focused on skills and self-sufficiency for their children. They are also more comfortable with authoritative parenting: setting rules and monitoring (spying on) their children. The nature of childrearing is deeply contextual to local cultures and customs at a given period of time. As childhood changes, and the ways that children learn change, choices and values of parents

also evolve. I return to these themes in Chapter 7.

2.5 Chapter Summary

This chapter describes prior work in youth's use of technology and parents' perspectives on the role of technology in their family. It concludes with broader societal perspectives on technology use and a culture of fear around technology use. I build on this body of literature in this dissertation and contribution new results on how parents manage youths' technology use.

CHAPTER III

HUMAN-CENTERED COMPUTING AND MY APPROACH TO RESEARCH

In this chapter I explain the theoretical underpinnings for my research. I describe the methods I used to conduct my studies and look to position myself in this work. This approach draws from social science and qualitative research in particular, in which the researcher positions herself in the work and takes a reflexive view throughout the data collection and analysis. I reflect on my own upbringing, class, and race, and throughout the document look to return to my position in interpreting the data. I go into detail in my approach to research in the following sections. Table 3 shows the methods I use in this research.

3.1 Human-Centered Computing

Human-Centered Computing (HCC) research builds on traditions from both computing and social science. HCC recognizes that the design and use of computing applications relies on a fundamentally human problem. What do people and society want or need and how can technology help them? Thus, HCC is a socio-technical approach to research, combining social needs with novel technical solutions. HCC can address relationships betweeen a single person and her device, or scale up to groups, teams, communities, and societies. HCC also brings in theories about how people learn, human behavior, collaboration and competition, and other social, psychological, and economic principles. HCC research has taken an increasingly strong turn towards focusing on society level social problems, like health, education, and poverty.

What distinguishes HCC from a more established discipline like Computer Science

Table 3: Methods and approach to research.

Study	**Methods**
Parent formative study	qualitative interviews [Spradley, 1979, Seidman, 2005]; holistic description of events, procedures, and philosophies occurring in natural settings
Parent Pre-Survey	survey methodology [Groves et al., 2004]; the psychology of survey response [Tourangeau et al., 2000]
ParentNet pilot	participation observation [Spradley, 1979]; log file analysis [Bernard J. Jansen, 2009]
ParentNet deployment	design-based research; iterative design process driven by theory [Barab *et al.*, 2004]
Parent Post-Focus Groups	evaluate a particular program of activities [K.E. et al., 1994]; useful for triangulation and fact-checking [Morgan, 1998]
Interviews with low income parents	Defamiliarization [Bell *et al.*, 2005]; deprivilege the perspective of the dominant group [Anderson, 2003]

is the process and outcome through which technology is designed, which places the human at the center of that process. What distinguishes HCC from disciplines like Sociology and Anthropology is the deeply interventionist and technological part of the process. HCC involves the studie of human behavior in order to design and intervene new technologies in hopefully helpful ways. HCC extends HCI but acknowledges the human at the center of the process instead of the interaction between the human and the computer as the focal point. HCC also often focuses on communities and cultures rather than individuals. With that said, HCI has recently evolved to overlap heavily with HCC (as indicated by the topics of papers at recent CHI conferences, for example). My goal in conducting HCC research is to consider social uses of technology from both qualitative and quantitative approaches with an eye towards the design of new web-based systems and platforms. I bring to HCC insights about social relationships between parents and youth as well as expertise in how people learn. I also draw from learning science theories to better understand social uses of technology and why people adopt–or reject–technology.

HCC is heavily interdisciplinary and researchers are challenged to pull from different disciplines and methods in ways that serve HCC research while maintaining commitments to the values and discipline from which they came. For example, ethnographers and anthropologists write about themselves in their accounts of their research. In "Gender Play," Barrie Thorne describes how she "Learns from Kids" through extensive time observing and hanging out with them [Thorne, 1993]. danah boyd takes a similar approach called "Choose Your Own Ethnography" in which she situates her own identity within those of the youth she interviewed [Boyd, 2008]. I draw from these qualitative approaches as an approach called activity that has been used in other HCC-like research. As *socio-technical* research, my work foregrounds the interplay between how technology shapes people and how people shape technology [Bijker, 1995, Pinch and Bijker, 1984, Latour and Woolgar, 1979].

I use a mixed-methods approach in my research, combining qualitative and quantitative work with a design approach [Barab and Squire, 2004]. I have not conducted a controlled study in this dissertation. In Chapter 5, I describe a design intervention called ParentNet that I deployed and evaluated with parents at an Atlanta school. It took me years to develop a strong enough relationship with this school to implement an intervention in the natural environment. For that reason, I have no control and experimental groups. Partnering with a second school with whom I wasn't able to fully invest myself with a design intervention would not be a real control group. And as I quickly learned, within a single school, people talk, and engaging one set of parents in a social media based intervention without allowing others to participate would have been unfair and problematic. Thus, in this dissertation I look to understand and describe the successes and failures of the intervention in a school setting and pull broader insights where possible.

There are tradeoffs between controlled studies versus *in situ* studies. Through the researcher's lens, studying the lived environment is fundamental to social science reseearch; in computing, it can be seen as messy, difficult to evaluate, and inconclusive. As such, I take a socio-technical approach to this research. I seek to understand how parents conceptualize the role of technology in their family's lives and how they reorient themselves around a particular design intervention.

Researchers have called for more reflexivity in HCI research [Rode, 2011]. Reflexivity refers to the ways in which the research approaches and outputs are impacted by the people doing the research [Davies, 2002]. As anthropologists have long known, it is impossible for researchers to write about other people without letting their own voice and preexisting biases into the writing [Merton, 1996]. Thus, I look to position my own presence in this research, recognizing the tension Bardzell describes between pursuing a socially conscious agenda and achieving scientific and moral objectives [Bardzell and Bardzell, 2011].

I was raised in Southern California and attended a private school from Kindergarten through 6th grade. Because of this, I had some experience in understanding how private schools work and the nature of students and their families who attend a good private school. I went to the local public schools from 7th-12th grade; both my junior high and high school were very diverse and have since become majority Hispanic demographics. Thus, I grew up experiencing different and sometimes tense race relationships (e.g. "white pride" and "brown pride" scribbled all over school bathroom walls). Atlanta is also diverse, though with different demographics, and I believe it is extremely improtant to understand and design for different cultures and kinds of users.

My interest in culture and identity is also a personal one. My parents are Indian and Australian and both moved to the U.S in their 20's. As a child, I felt that I was raised a little bit differently because of their newcomer status to American culture, though over time I have assimilated comfortably. I'm not sure that my upbringing was all that different than anyone else's, it just sometimes felt like it was. Maybe I was simply aware that my parents–especially my Indian father–had been raised in a different culture than my classmate's American-born parents. In terms of parenting styles in my family, one of my parents was definitely the authoritarian parent. The other was authoritative and played the secondary parenting role. They were strict about our technology use and we never had Nintendos, Game Boys, or any of the other game consoles and handheld devices that our friends had. On the other hand, computers were just fine and we played games on computers generally when we wanted to. We spent a lot of time on the computer, but we also played a lot of sports and I don't recall ever feeling that I spent "too much" time on the computer.

My upbringing was middle and upper class. My father is a programmer and my mother worked with computers until she had my brothers and I, at which point she became a stay-at-home mom. Though my father is a programmer, I didn't know

anything about or ask about computer science until I took a required CS course in my undergraduate Engineering degree. My first Engineering course involved my group building a pneumatic-powered wheelchair to help nurses transfer patients to hospital beds (a problem that remains unsolved). At that point I became excited about the idea of building technology to support social needs. I worked as a programmer for two years, then returned to school to get my MS at Berkeley's iSchool, then joined the HCC program. Each of these stages allowed me to pursue the study and design of social systems, from a range of ideologies and perspectives. At Berkeley and early during my PhD at Georgia Tech I focused on youth and digital media use (e.g. [Yardi , 2006]). This led me to the broadening participation in computing research group at Georgia Tech (e.g. [Bruckman, 2009]) where I continued to focus on youth, but this time looking at how youth adopt and interpret computation in their lives [Yardi et al., 2011].

My trajectory to this dissertation topic was a windy one. As I was doing this research, I began to notice that youth felt pretty comfortable with their devices. Certainly, they went through with familiar adolescent stuggles around relationships, fitting in, and identity, but the incorporation of cell phones and laptops into their lives was one that was largely embraced by them (see [Ito, 2009] for accounts of this). What I did observe was that parents were the ones who were worried about technology. I was fascinated to want to understand what these concerns were about and what I could do to help alleviate them. This dissertation was born out of that goal.

3.2 Data Collection

In working with parents, my goal was to learn about their culture from their own perspective. In one role, I was a Georgia Tech researcher; in another, I was a digital native (born in 1980, I just missed this category but parents still saw me as one).

Barrie Thorne describes the nature of fieldwork eloquently:

> *"Like Westerners doing fieldwork in colonized Third World cultures, or academics studying the urban poor, when adults research children, they "study down," seeking understanding across lines of differences and inequality. When the research is within their own culture, the "studying down" comes swathed in a sense of familiarity. Despite their structural privilege, Western ethnographers who enter a radically different culture find themselves in the humbling stance of a novice. But it is hard to think of one's self as a novice when studying those who are defined as learners of one's own culture. To learn from children, adults have to challenge the deep assumption that they already know what children are "like," both because, as former children, adults have been there, and because, as adults, they regard children as less complete versions of themselves. When adults seek to learn about and from children, the challenge is to take the closely familiar and to render it strange." [Thorne, 1993]*

I had my own views on youth and technology (which, to be transparent, are generally optimistic and progressive views, a perspective shared by most digital youth researchers), and I sought to understand where parents were coming from. Thus, when parents told me they monitored their children serendipitously, or that they thought Gmail was evil, I sought to be objective regardless of my personal views. My research is focused on parents, but of course this relates to understanding youth. As Thorne says in her research of studying youth.

> *"I wanted to sustain an attitude of respectful discovery, to uncover and document kids' points of views and meanings. To adopt that basic stance means breaking with an array of common adult assumptions; that children's daily actions are mostly trivial, worthy of notice only when they*

seem cute or irritating; that children need to be actively managed or controlled; that children are relatively passive recipients of adult training and socialization."

Recent research puts children as the experts in technology domains [Palfrey and Gasser, 2008] (though this is debated [Hargittai, 2010]). Today's rhetoric assumes many parents are clueless about technology, or that they haven't thought through their approaches to managing technology. My goal is to move beyond these characterizations and to use the data to tell parents' stories. They saw me as an expert in technology and social media and I tried to make them comfortable sharing their stories. Fortunately, as a childless researcher studying parents, I was in a domain where by definition I was already a "novice" in their expert environment. For that perspective, I am grateful, because it mitigated the power dynamic where I might have otherwise been perceived as the expert in their domain. With that said, I was aware that parents might be face-saving, or trying to present themselves in a way that they though I wanted to hear. Pierce wrote, in 1908 (as cited in [Orne, 1962]):

"It is to the highest degree probable that the subject['s] ... general attitude of mind is that of ready complacency and cheerful willingness to assist the investigator in every possible way by reporting to him those very things which he is most eager to find, and that the very questions of the experimenter ... suggest the shade of reply expected . . . . Indeed . it seems too often as if the subject were now regarded as a stupid automaton."

When I met parents outside of a research context, they always had opinions about their own children and social media use. Most conveyed the struggles that they face in this new world of parenting. However, each parent's experience was different. Some felt comfortable and confident with the role of technology in their home lives (particularly, academic researchers who were also parents). Thus, I looked to characterize

individual experiences as well as to generalize where appropriate. For the qualitative research in this work, the reader has access to the methods and analysis I used and it is the reader's right to judge for him or herself the ecological validity of my interpretations.

For the quantitative and design research, I describe my methods in each chapter. I designed ParentNet using an out of the box social network platform and adding PHP and MySql extensions to customize it for the study. I used Javascript to log use of the site and Google Analytics to visualize patterns of use over time. The design and evaluation are described in Chapters 5 and 6.

3.3 Design-Based Research

I take a design-based research (DBR) approach in this dissertation. DBR focuses on the importance of the natural environment for a more complete understanding of learning and social behavior. While lab-based experiments offer the benefits of controlled variables and experimental settings, they leave out context and can be an impoverished setting for understanding how things naturally occur in the world [Brown, 1992].

"Research moves beyond simply observing and actually involves systematically engineering these contexts in ways that allow us to improve and generate evidence-based claims about learning. The commitment to examining learning in naturalistic contexts, many of which are designed and systematically changed by the researcher, necessitates the development of a methodological toolkit for deriving evidence-based claims from these contexts" [Barab *et al.*, 2004].

The goal of DBR is to produce new theories and artifacts that explain and potentially intervene in natural settings. DBR is an interventionist approach to research because of the design component, and because the researcher herself is generally inextricably tied into the research process. The researcher and the participants take

active roles in co-constructing the context that the research takes place. "Just as we create boundaries for the sake of control and explanation, we need to remember that the world does not divide itself at researcher-defined seams" [Barab *et al.*, 2004]. In the case of a school community-based intervention, the researcher (as well as the school staff, participants, parents, and students) are actively involved in conversation throughout the process.

Design experiments were developed as a way to conduct formative research and present iterative designs based on prior work. Development and research take place in an interative process of design, deployment, analysis, and redesign. DBR has been espoused in the learning sciences community, particularly at a time where learning was increasingly being seen as more than just what occurs in the classroom. As such, traditional educational research metrics were subpar for understanding learning in natural environments (which can include the classroom).

Designing successful online discussions is challenging, especially ones that are designed to foster learning or knowledge transfer to participants. Discussions should be sustained and should have broad participation but obstacles exist to participation in online learning environments; namely, deciding to particpe, keeping up with the discussion, and coming up with contributions [Guzdial and Turns, 2000]. Early systems to support online interactions targeted features like discussion management and facilitation [Guzdial and Turns, 2000] and anchored collaboration [Hmelo *et al.*, 1998]. Motivating participation online remains a challenge for designers [Lampe *et al.*, 2010]. In particular, good site design and engaging features are no longer enough to promote use and engagement. Sites are competing for users' attention and social factors are just as important or possibly more important than usability [Lampe *et al.*, 2010]. Users end up staying on sites and participating for different reasons than they originally came to the site and users have a variety of motivations for staying or leaving [Lampe *et al.*, 2010].

In my research, I conducted formative research about parents' attitudes towards technology the designed and piloted ParentNet, an intervention for parents. After a yearlong pilot I refined and redeployed ParentNet again for a second year and evaluated use and engagement. From this I develop new ideas about how the challenges parents face and how to support them in the "technoparenting" process. As I have conducted this research, I have tried to make sense of how parents learn about technology, or more often, how to explain when they don't learn about it.

I want to also to reflect on what worked and what didn't in this approach to research (which I return to in Chapter 6). Like many research projects, I have come away with more questions than answers, and a desire to go back into the field and work with parents based on what I know now and what I didn't know then. I went into this research taking an action research-like approach, wanting to understand what parents were dealing with and help make their lives a bit easier with respect to technology in their family's lives. As I continued through the complexities of working with parents, understanding school agendas and policies, and the scope of technology use in youths' lives, my intervention became a "technology probe" [Hutchinson, 2003] as much as an agent for change. By technology probe, I mean that it was a tool through which to gain more insight into the community and its workings than I ever would have otherwise. It became a computational artifact through which to understand the differences between parents said and what they did. As such, the contributions of this dissertation are descriptive in its portrayal of parents and the technology landscape, and design-oriented in inspiring researchers and designers to think about new kinds of support tools for parents.

3.4 Interpreting the Data

The social world of computing is not relatively well ordered with participants adopting stable roles. Instead, social groups experience conflicts, manipulating channels of

communication to gain valued resources [Kling, 1980]. Halverson tells us that theory should help us talk about the world by naming important aspects of the conceptual structure and how it maps to the real world. "From this point of view, theories are more like a pair of dark glasses. We put them on and the world is tinted. The change brings some objects into sharper contrast, while others fade into obscurity" [Halverson, 2002]. She proposes that theories need to have relevant application to the research at hand in terms of real world pragmatic usefulness. Usefulness, however, can take many forms, including system design, as well as the design of policies, laws, and educational implications. Theories have three kinds of powers [Halverson, 2002]:

1. Descriptive power: Theory should provide a conceptual framework that helps us make sense of and describe the world.

2. Rhetorical power: Theory should help us talk about the world by naming important aspects of the conceptual structure and how it maps to the real world.

3. Inferential power: Without engaging in arguments about whether theories are true, or only falsifiable, we do want a theory to help us make inferences.

My human-centered approach to research weaves together a number of intellectual trajectories. Placing the social context at the heart of the research, I draw on the interpretivist quadrant of Burrell and Morgan's four sociological paradigms. The lens through which I approach my research reveals the world as an emergent social process that is created by the people in it. Burrell and Morgan describe the nature of the interpretive paradigm, which attempts "to understand and explain the social world primarily from the point of view of the actors directly involved in the social process" [Burrell and Morgan, 1979]. Research in the interpretive paradigm looks to understand people, their thoughts, feelings, and actions, and how these are expressed in their external actions and goals.

There are design and quantitative components to this dissertation, however the bulk of the analysis centers around qualitative data. Qualitative research is about revealing context and surfacing complexity. The power in qualitative research lies in what Geertz calls "thick description." This transforms decontextualization–"armchair ethnography"–to the study of people in their natural environment [Wittel, 2000]. I take a thematic analysis approach to my data analysis. However, thematic analysis is the first step in an iterative research trajectory. This means I 1) developed familiarity with the data; 2) identified recurring patterns; 3) organized items of interest; 4) coded the data; and 5) organized the data into high-level themes. From my initial interview study I developed theories about parenting and technology. The results of that study informed subsequent studies in an iterative approach where I had ideas about what themes were likely to come out of the research.

> *What is necessary is a thick description of the network, its dynamic and the interplay of relations between people, things, activities and meanings. This kind of ethnography neither searches for deep dimensions within a culture, nor for hidden layers of meaning. Instead culture is created in the area of the "in between", it is a dynamic process, it is about becoming and fading away. [Wittel, 2000]*

While my research draws from anthropological roots [Geertz, 1983], I deviate from anthropology's approach to studying human behavior by situating oneself in the culture being studied while trying to minimally disrupt the nature of those being studied. My research with parents instead required me both observe and intervene in participants' lives, taking an action oriented approach. I wore two hats: one as the objective researcher hat looking to understand parents' lives, the other as a technical expert hat, being willing to interpret parents' questions and give them advice if they asked for it from me. I believe in taking an activist approach to research and when

parents asked for help I was willing to share my perspectives, but I took great care to differentiate those conversations when analyzing and interpreting my data.

Finally, understanding technology use in families requires a particular set of technological frames [Orlikowski and Gash, 1994]. Such frames acknowledge that members of a social group come to have understandings of particular technological artifacts, and they include not only knowledge about the particular technology but also local understanding of specific uses in a given setting" [Orlikowski and Gash, 1994]. Technological frames explain how people's assumptions and expectations and the role of technology will impact how they decide to design and use such technologies [Orlikowski and Gash, 1994, Pinch and Bijker, 1984]. Interpreting these perspectives requires understanding the multiple social groups that exist among my participants and the different ways they may incorporate and interpret technology in their lives [Orlikowski and Gash, 1994].

3.4.1 Activity Theory

My approach to organizing the data is inspired by an activity theory (AT) framework. AT is a useful framework for understanding people's relationships with technology [Nardi *et al.*, 2009]. Parenting is already a complex process and the steady firehose of new technologies in children's lives adds more layers of complexity. Activity theory acknowledges the dynamic and potentially disruptive impact that technology can add to the parenting process. At the same time, it gives voice to a parent's greater motive-the development of healthy, well-adjusted teenagers.

AT consists of a set of basic principles which constitute a general conceptual system, including object-orientedness, the dual concepts of internalization/externalization, tool mediation, hierarchical structure of activity, and continuous development [Kuutti and Nardi, 1996]. An activity is a form of doing, or performing, which is directed to an object. Activities are distinguished from each other according to their objects of

focus. An activity is seen as a system of a human-an actor-doing something, where a subject works on an object in order to obtain a desired outcome. In order to accomplish this, the subject employs tools, which may be external (such as a hammer) or internal (such as a plan). Thus, AT states that the relationship between subject and object is mediated by "tools," the relationship between subject and community is mediated by "rules" and the relationship between object and community is mediated by the "division of labor." "The tool is at the same time both enabling and limiting: it empowers the subject in the transformation process with the historically collected experience and skill 'crystallized' to it, but it also restricts the interaction to be from the perspective of that particular tool or instrument; other potential features of an object remain invisible to the subject..." [Kuutti and Nardi, 1996].

Halverson tells us that theory should help us talk about the world by naming important aspects of the conceptual structure and how it maps to the real world. AT's historical origins were derived from Vygotsky's notion of "mediation" [Wertsch, 1988]. Vygotsky described the relation between the human agent and the object as mediated by cultural means or artifacts, where the mediation artifacts were signs and tools. "What is anointed by the theory is the observed qualities of the representational states and media, and observing how processes bring those media into coordination" [Halverson, 2002].

Thus, consciousness doesn't exist situated inside the head of the individual but in the interaction - realized through material activity - between the individual and the objective forms of culture created by the labour of mankind [Nardi, 1996]. Halverson describes the features of AT that give it such rhetorical power:

1. "AT has named its theoretical constructs well. Naming is very powerful - both for communicative as well as descriptive reasons (the primary theoretical concept of activity theory is activity and which is comprised of action, and mediating artifacts is a named category).

2. The perspective of the individual is at the center of everything, where the commitment to a unit of analysis defined in relation to the complex phenomena being observed.

3. AT's basic structure posits certain kinds of process interrelationship, keeping process explicitly in the foreground by diagramming relations between elements within the activity system The three points above speak to AT's usefulness for naming the mediating relationships between subject and object and activity.

AT evolved from Leont'ev's observation of the richness of the social world and the activities embedded in it. Leont'ev viewed human processes as phenomena and developed AT as a framework for mapping the elements that influence human activity (see Figure 1). Activity systems consist of a group of people-the community-who have shared goals and interests-their object. Subjects are the people directly involved in the activity. In the context of parenting and technology use, the object is supporting the development of healthy, well-adjusted teenagers and the community consists of parents, schools, teachers, and government. The subjects—the people engaged in the activity of parenting—are the parents (see Table 4.1.3 [Kuutti and Nardi, 1996]). I use this framework in my formative work in the next section.

3.5 Chapter Summary

This chapter presents my approach to research and data analysis. I describe my intellectual trajectory drawing from social theories about the role of technology in lives experiences. I describe influences that inspire my work and draw on theoretical frameworks to present data in this document. In the next chapter, I present background material and related work.

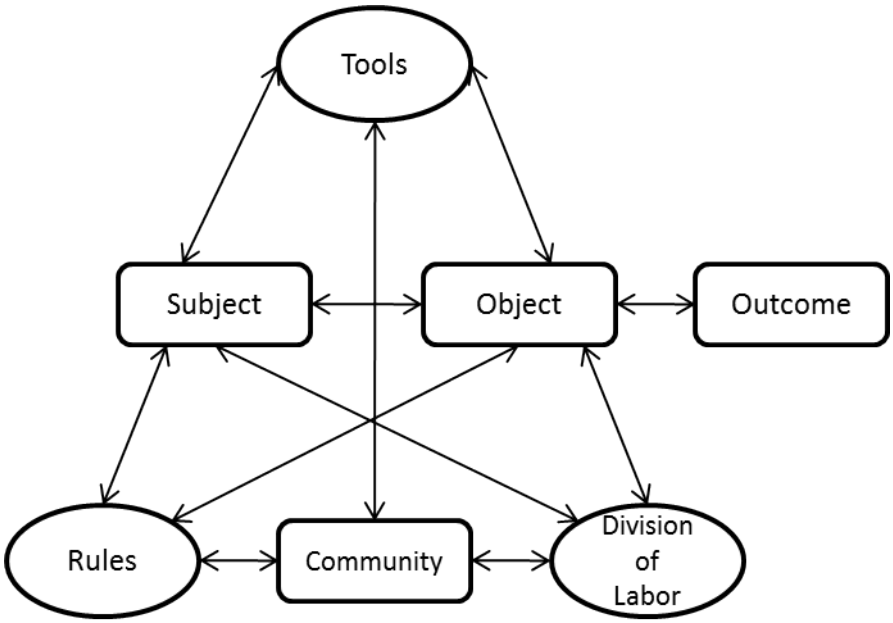

Figure 1: Activity theory components. [Kuutti and Nardi, 1996]

CHAPTER IV

IDENTIFYING CHALLENGES IN PARENTING YOUTH TECHNOLOGY USE

This chapter examines what challenges parents face in the process of parenting their children's social media use. I conducted an interview study with 16 parents from suburban neighborhoods in Atlanta, GA to investigate this question. I complemented those results with a survey of 53 parents from the same background. This chapter describes the struggles and strategies they report in parenting their children's technology use. I begin with a thematic analysis approach to analyze the interview data, then use a framework inspired by activity theory to organize the results and consider them in the context of how parents set boundaries around technology use. The results from this research are published in Yardi and Bruckman [2011].

4.1 Formative Fieldwork

4.1.1 Study 1: Interview Study

I recruited a sample of parents who were likely to have access to technology through contacts at a local school and word of mouth. The local school was one I developed a long-term relationship with over a four-year period. The average tuition at the school is over $20,000 per year, and a relatively small percentage of students receive financial aid (about 7% of total tuition owed). I did not ask participants their religious or political views; however, some of these came up during the interviews and among those, participants leaned towards Christian and Republican. The parents I interviewed were similarly mostly middle to upper class and Caucasian. In general, parents did not suggest that they were early adopters (e.g. waiting in line to buy an

iPad) but they were economically able to buy new technologies. The sample I interviewed is a self-selected convenience sample. I was looking for a sample of parents to design ParentNet for. In Chapter 7 I discuss limitations of this approach and broader relevance.

I conducted interviews with 2 fathers and 14 mothers during the winter and spring of 2010. The 16 participants (none of whom were related) had a combined total of 41 children. Each parent had at least one teen and most had more than one. Each interview was conducted in person at participants' convenience, in their homes, at their child's school, or at local coffee shops. Interviews were recorded and transcribed with permission. The length of the interviews ranged from 40 minutes to 1.5 hours and averaged just over one hour. Asking parents about their parenting abilities and struggles can be sensitive for the parent because parents may not want to reveal weaknesses or bad parenting. To mitigate social desirability in their responses I structured the interview protocol to begin with conversational stories about their children and what they liked to do online. As the interview progressed, I moved toward more personal questions like what kinds of rules had they set, whether their children were monitored and how, and the challenges or concerns with which they dealt. I also asked whether they thought schools and government should have any responsibility in children's technology use. Participant names are anonymized and referred to using a letter-number combination. Throughout this document, quotes from parents are from the school I conducted my research with except in Chapter 7 where identified otherwise.

I used a thematic analysis approach [Boyatzis, 1998]. Transcripts were coded for mentions of technology use and of parenting. I sorted by themes and coded for intersections between teen technology use and parenting.

Table 4: Participant demographics. Individual family structures have been aggregated to maintain privacy.

Participants		**Participants' Children**	
Mother	14	(Total) Girls	22
Father	2	(Total) Boys	19
Family size		**children's Ages**	
1 child/family	0	<8	7
2 children/family	2	8-11	9
3 children/family	7	12-17	17
4 children/family	4	>18	8

4.1.2 Study 2: Web-based Survey

I administered an online survey to the first 100 middle school parents who joined the parent network (see Chapter 5) in September 2010, two weeks after the beginning of the school year. The survey asked parents about their own technical abilities and their children's technical abilities. This part of the survey was administered as a Likert scale to compare parents' ratings of themselves and their children. A 10-point scale was used to accommodate social desirability bias (where parents might all give an above average rating because they are disinclined to rate their own parenting skills as below average [Crowne and Marlowe, 1960]). The survey also contained open-ended response questions about what kinds of rules parents set around home technology use. The wording of one question was "Do you have any rules about how your children can use technology? If so, what kinds of rules do you have?" The open-ended responses were coded using a thematic analysis.

Of the 100 parents, 53 responded to the Likert scale section and 47 responded to

the free response section. Of the 53, 38 had at least one child in grade 6 and 15 had at least one child in grade 7 or grade 8. The average number of children in each family was 1.77 which is similar to the national average in the U.S. (1.89) [U.S.Census, 2004]. Among the first child for each family in my survey, 44% got a cell phone in grade 6 and 32% got one in grade 7. This is slightly younger than, but close to, national data which indicates that the bulk of children are getting cell phones at ages 12 and 13 [Lenhart, 2010].

Parents were asked what grade their children were in when they first got a cell phone. Among the first child for each family (unit of analysis is the family rather than child so that large families are not overweighted), 8 have children who got a cell phone in grade 5, 22 got one in grade 6, and 17 got one in grade 7, or 14%, 44%, and 32%, respectively. Only a few children get them earlier or later (see Figure 2). Of the 36 current 6th grade parents, 19 (53%) of their 6th graders did not have a cell phone yet, 17 (47%) did have one (see Figure 3).

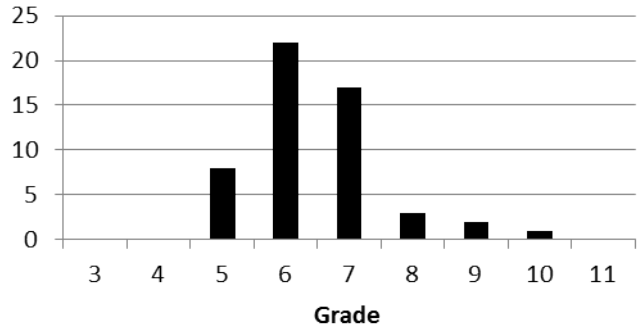

Figure 2: What grade children were in when they got their first cell phone (n=53).

4.1.3 Analysis: Activity Theory

My approach to organizing the data is inspired by an activity theory (AT) framework. AT is a useful framework for understanding people's relationships with technology [Nardi *et al.*, 2009]. Parenting is already a complex process and the steady firehose of new technologies in children's lives adds more layers of complexity. Activity theory

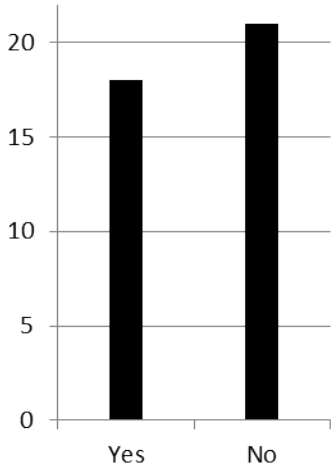

Figure 3: Number of grade 6 children who currently have a cell phone at the beginning of the school year (n=36).

acknowledges the dynamic and potentially disruptive impact that technology can add to the parenting process. At the same time, it gives voice to a parent's greater motive-the development of healthy, well-adjusted teenagers. Activity systems consist of a group of people-the community-who have shared goals and interests-their object. Subjects are the people directly involved in the activity. In the context of parenting and technology use, the object is supporting the development of healthy, well-adjusted teenagers and the community consists of parents, schools, teachers, and government. The subjects—the people engaged in the activity of parenting—are the parents (see Table 4.1.3).

Tools and rules are the components that help frame how the activity is accomplished, and what norms and conventions are adhered to while engaging in it. Division of labor explains how work is divided among people involved in the activity. In the context of parenting, tools are the technological means through which parents can monitor and manage their children's use of technology (e.g. checking browser history). Rules are the boundaries and expectations set by parents regarding how children should use the technology (e.g. texting during dinner).

Table 5: Activity theory components for technoparenting.

Component	**Description**
Object	Development of healthy, well-adjusted teenagers
Subject	Parents
Community	Parents, schools, teachers, government
Rules	Technology curfews, location, frequency
Tools	Monitoring software, browser history, cell phones
Division of labor	Parents, schools, teachers, government

Division of labor breaks down the responsibility of monitoring and managing teens' technology use into relevant stakeholders such as parents, teachers, or lawmakers. The concept of divided labor has a long history in economics, which has focused on specialization of skills for workers and productivity. Dividing work into subtasks enabled a more productive whole. However, people may disagree about how labor should be divided or how much authority is assigned to various positions, causing conflicts within the activity system. The blend of physical and digital leaves a murky trail. When children behave inappropriately at school on their own cell phone, who is responsible? How about if they use a school laptop at home (or even a personal computer at home) on the weekend to bully a classmate from school? The issues are complicated and have become the subject of national and global debates.

A key property of AT is that all the components are related. People work together using tools, setting rules, or towards an outcome, and each component is mediated by the other components. See [Engestrom, 1999] for a detailed treatment of activity theory.

4.2 Transformation of Parenting around Rules, Tools, and Division of Labor

As teens adopt new technologies and communication practices, parents' activities are transformed along a number of dimensions. The following sections are structured around 1) self reports from parents about their and their children's competency with technology and 2) challenges parents face and rules they set around technology use. I organize the data by rules, tools, and division of labor using an activity theory framework. Each section highlights key themes in the interview data and frames results in a broader context of new information.

4.2.1 Rules: Setting Expectations for Technology Use

Parents set rules based on time of day, frequency of use, and location of use. Parents set more limits on their preteens and young children than on older teens. As children grow into teenagers, parents tended to lift the limits, or more likely, simply stop enforcing them as the battle with the teen becomes overbearing. Sixth grade tended to be a tipping point. Middle school parents said that the sixth grade was when their child began complaining that everyone else had cell phones.

"If you ask her, she's the only one in the world without a cell phone."

The free-response answers to rule-setting among participants confirmed and expanded on the interview results. Rules are categorized by time, location, sites, communication, monitoring, and etiquette. Table 4.2.1 shows a summary of key rules reported in the survey responses. The results indicate a wide range of strategies that parents try in managing technology use at home. Some set hard rule about time of day that technology can be used, where it can be used, and what sites are off limits. Others set softer rules that vary with homework time and socializing. In the survey I asked parents what rules they set at home around technology use but did not ask for a comprehensive list: thus, the themes here present a subset of rules parents set as

Table 6: Rules set by middle school parents around cell phone and Internet use.

Rule	**n**
Time: what times technology be used	27
Location: where technology can be used in the home	20
Sites: what sites are appropriate for children to visit	13
Communication: technology used for coordination, convenience and emergencies	12
Monitoring: how parents keep an eye on technology use	9
Etiquette: socially appropriate uses of technology	5

technology is brought into the home. In the next section I consider these in context of theories about domestication more broadly.

4.2.1.1 Time of Day

Of the 53 survey responses, 27 parents reporting setting rules about when laptops and mobile phones could be used. Many had specific times in the evening when technology use had to stop. P8 said the Internet was not to be used after 8pm. P12 also had an 8pm time limit unless it was being used for homework. P19 required that the mobile phone be in the kitchen by 9pm, P32 did not allow talking or texting after 9pm, and P38's rule was no Gmail past 10pm. P8 said her children were not allowed to use mobile phones after 10:30pm on weekdays and 11:00pm on weekends. Others mentioned "bedtime" and "nighttime" as cutoffs. On weekends, some parents felt playtime with other children was a "reprieve" from the rules, others took away technology because groups of children together increased opportunities for misuse.

Parents established different rules on weekends or when friends were visiting, though some parents became authoritarian and others became more permissive. P8

said her children were not allowed to use cell phones after 10:30 on weekdays and 11pm on weekends. P45 noted that cell phones were taken away at 11:00 when friends come over. All remotes to games were also taken away. P18 stated that the phone was turned off at night but they had no specific rules since it had not yet been an issue. In contrast, P14 relaxed her rules when her children went to friends' houses, giving them a reprieve from her own rules which she readily acknowledged as being quite strict.

Parents of preteens more regularly enforced rules about evening use. Parents of older teens felt it was difficult to enforce these rules. W14's son liked to play Xbox on the weekends and she suspected he also played it at night after she was asleep. However, she noted that he was an athlete and practiced eight times a week with some early morning practices, so he *"just can't play as late as he probably otherwise would."* Some parents proactively enforced cutoff times in the evening; others asked their children to stop and hoped the rules wee mostly being followed. One parent said:

> *"We have a cutoff at our house, a blanket rule. The phones and computer come down at 10pm and they have to leave it downstairs. And if they don't bring it down then the Internet is cut off. After 10pm? They can go to sleep! Or study. We've had that rule forever."* -M10

This particular parent was quite firm in her beliefs about what boundaries her children could or not cross with her. When talking with her I got the impression that she was the rule-enforcer in the home, and that it was expected her children would be following her rules. With that said, she didn't try to distinguish between age of child or different needs, choosing to simply set a particular family-wide rule and keeping it. As another parent said, "What in the world do you need to be talking about after 11?" She emphasized that sleep was important for everyone in the family,

and phone calls late at night were not accepted. However, she did not address how she enforced these rules or even whether she did. She also did not say whether the phone limits applied to her children's cell phones instead of just the family landline. Almost all of my conversations with parents included a discussion about the time of day that technology was being used. However, these conversations often revealed, or turned into, the second part of what concerned them which was the frequency of use. Given that children are in school and eating much of their day time, early through late evening was when they were using technology, and the frequency they were doing so was astounding to some parents.

4.2.1.2 Frequency of Use

Most parents I talked to said that they wondered "how much is too much" in terms of technology use and its effects on their children's social development and relationships. All parents said that frequency of cell phone and Internet use was a hard problem for them. Some were very concerned about overuse although none of them had a hard definition in terms of time or frequency, that defined "overuse." In fact, parents who had set number limits per month generally found themselves giving up and loosening and limits because they were too hard to enforce. Others did not like the heavy use but let it happen and looked for other measures like health and grades to indicate overuse. Finally, some were not too concerned about it. Often these were parents who children were so busy with school and after school activity that the children just didn't have enough time to use technology excessively, from the parents' perspective.

One father lamented his 14-year-old daughter's regular 6,000 texts a month. He was constantly debating with her whether she needed to be texting that much, but she replied that when she sent out a single text about a movie, 30 people might reply at once, which would drive her up dramatically. This particular father was a very technical person, he worked at a telecom company, and he liked that his daughter

was active with technology, but he wondered if she knew how to maintain balance in her life, or how she would learn to do so.

In contrast, a mother I talked to was far more strict with her children. She was an active Christian and guided her children to socialize and make friends with other church-going children. She had firm rules with her children, though the oldest was just reaching middle school and not old enough to be asking for a lot yet. For her, everything was a tradeoff. Her children had 30 minutes of TV viewing a day and their rewards and punishments often fed into adding or subtracting from this media time. She maintained a time card system where they had to "purchase" their media time from her. Good behavior bought more media time. She did not like her son going to friends' houses and playing Wii for three hours but she let him enjoy this "reprieve" from her rules. She was strongly opposed to the norms that had developed around technology use, lamenting that when she would go to a basketball game or some other sporting event, her daughter's friends were just playing on their phones instead of paying attention. For her, their use was excessive and cut into family and face-to-face time. Another parent also observed the heavy use:

> *"I have limits on her phone. Part of it is she just can't help herself. If the phone is there, she can't stop doing it. In the morning it buzzes with a text message from a friend. When she's in exams we'll try to keep the phone out of her room and it's a constant battle. So I've put time limits and number limits and I've basically given her the latitude to say as long as your school work's okay, it's up to you."* -J3

J3 had conceded setting hard rules like number of texts or late night cutoffs. He told me it was just too hard to keep up with that behavior. Instead he used other metrics, ones that he was already monitoring anyway like sleep, diet, and grades, as proxies. If those were continuing at satisfactory levels, he tried to not say too much

about the excessive phone use. Another mother took a similar stance, deciding not to take the technology away. She didn't like her children texting and surfing late at night but she said she didn't want to "micromanage." Like many parents, micromanaging was not part of her parenting philosophy, but it was also just exhausting to try to do.

During these interviews, I found myself quite surprised that parents did not mention technology-sharing tensions at home. This finding was different than those in prior work, which presented it as an interesting problem [Grinter *et al.*, 2005] that could become heated and require regulation from parents [Frohlich and Kraut, 2002] (although [Brush and Inkpen, 2007] reported that families liked sharing in their study). The results from my work may be because participants are more likely to be able to afford laptops and cell phones for each member of the family as children grow older so sharing is not necessary. Each child owning her own devices, like laptops and cell phones, brought a new array of challenges for parents around *where* these devices could be used in the home.

4.2.1.3 Location of Use

All participants mentioned location of use, especially around the home. Of the 53 survey takers, 20 parents reported setting rules about location of laptop and mobile phone use. Interestingly, parents did not report having any moral or philosophical opposition to children using laptops in their bedrooms. Rather, parents were simply concerned that they could not see what their children were doing in there. Parents did not always trust their children to be managing their own activity responsibly, especially in the evening. Thus, parents designated "technology rooms," spaces that aligned with parents' existing daily routines (e.g. in the kitchen so a parent could watch while cooking dinner, or in the hallway so parents could see while walking back and forth). The bedroom was off-limits or semi-limited (e.g. before bedtime) whereas common spaces like the kitchen and living room were acceptable for use. Yet, rules

Table 7: Sample of rules about location of technology use.

Rule	
Laptop is kept in kitchen - always.	P41
The computer is in our family room, in clear view. internet in kitchen only.	P13
Phone in kitchen when home - not in child's room (for my younger child).	P9
Computers are to be used in common space unless approved or checked on frequently.	P8
Laptops are kept in kitchen overnight. Not allowed in bedrooms. Period.	P44
Phone stays in the kitchen and gets turned off before upstairs.	P11
Yes. Both turned off and charging in the kitchen each night by 10:30 at the latest.	P19
No internet in bedrooms-in family areas only.	P24
Computers off and in my room by 10pm.	P31

were hard to enforce.

Again, concerns and rules varied widely; some required that technology be used in public places at all times while others allowed complete freedom. Parents who set location rules consistently labeled the bedroom as off-limits or semi-limited (e.g. before bedtime). Common areas like the kitchen and living room were usually acceptable places to use the laptop. P8 did not allow technology use in the bedroom, and many other parents shared P8's view: "there are certain rooms in the house that are 'technology rooms.' The bedroom is not one of them." P19 and P4 similarly noted, "No computer in room" and "no laptop in bedroom." Parents set a number of other location-based rules (see Table 4.2.1.3).

Parents noted challenges in enforcing location rules. P4 established a rule that children could not have the computer behind a closed door and the computer had to be in the parents' room charging by 11:00pm. However, P4 found this rule difficult to enforce. It required "constant vigilance" and her children frequently fell asleep without bringing it into her room. P9 told me that while the Internet is supposed to be in the main room only, laptops meant that this rule had to be bent sometimes:

> *"They have to keep their computers downstairs. Same with cell phones. Our playroom is sort of at the center of our house. So they have a study desk; that's where they do their homework. I have to walk through that to get to the door. It's right outside of the kitchen;, it's not that I'm hawking them but I can see what they're doing all the time."* -S11

I heard many parents talk about location in the home in the same way. Another parent "loved" the idea of having the computer in one stationary place in the house. In her house, it had always been in the kitchen. However, after many interviews, it became clear to me that parents of younger children clung strongly to the idea of stationary technology. But, as their children grew up and asked for–demanded!–cell phones and laptops, parents eventually succumbed to the inevitability of it being mobile. W14 let her middle school aged son take his phone to the room but not all the time saying that she "would not be cool with that." K4 had not set location rules but noticed her son upstairs on his laptop for long periods and wondered if he was really working or just emailing and chatting. H3's son had gotten in trouble online, at a time when the computer was downstairs in the basement and was not being monitored. H3's concern was typical of many parents, all of whom wondered about how and when to set location rules.

Many parents became nolstagic in the interviews, reflecting on how things had been in their day. They were also forward-thinking, wondering how their children and their children's children would grow up. One parent said:

"I think the next generation will have a clear set of rules. We're all trying. One my sister uses which I wish we had started and I could put in place now is no cell phones upstairs from the day they get them." -J3

What J3 saw was that retroactive rule-setting was difficult or impossible. Unless taking away or limiting was being done as punishment, parents were not likely to give their children less access and freedom after more had been granted.

Parents reflected on the changes in the privacy of cell phone uses, like texting under the sheets at night, compared to their own experiences with "appliance models" [Brush and Inkpen, 2007], such as sharing a landline in the kitchen that relied on social protocols to mediate sharing of the item. One parent, who was very frustrated with his teenager at the time of the interview shared stories of his son's earlier behaviors with technology. He had asked his son to stop playing Duke Nukem in the basement and put it in the trash on the computer. But when he returned a week later it was on the computer again and his son simply said "you left it in the trash."

None of the parents I talked to said they used GPS to track their child's location. They may have been trying to hide that information from me, however, they shared other related kinds of behaviors with me so I don't have any reason to believe they would obscure this behavior. However, many households in the demographic I studied had one stay-at-home parent who might have been able to more proactively monitor the child. Even among those families, when there was more than one child, and especially three or more, parents said their children were no longer able to do their homework and other activities in the common rooms. One mom that I interviewed in her home said *"You've seen how much is going on around the house; how do I expect them to sit around the kitchen table and focus? I mean I can't focus."* Interestingly, the over activity of having many teens in the house meant that they scattered to their rooms quickly, for quiet and privacy. As a result, parents said things like *"One of the shames of it is that you don't get to talk to the kids' friends anymore unless*

they come to visit." This particular parent recalled when he returned to school every fall after summer, his phone would be "ringing off the hook." His comment reveals a lot about the sense of loss and insecurity that parents felt when their children had an increasingly independent and private world. Without the physical boundaries of the home to bound their children's social life, parents were increasingly isolated from their children's friends and relationships. This separation of parent and child already occurred naturally as part of the adolescent experience of identity exploration and formation, and teens' access to technology seemed to magnify this experience. I believe that there are design opportunities for encouraging parents and children to be online in the same spaces and this result seems to reinforce this opportunity.

4.2.2 Tools: Monitoring and Managing Technology Use

In activity theory, tools are the external mental processes that direct how the subject interacts with the object. Tools influence the subjects–the parents–and parents also influence the tools they use. Tools are also socially and culturally constructed and I saw in my research many cultural assumptions and expectations in how parents chose to use tools. A tool can be either social (psychological) or physical. In the parenting activity, social tools look a lot like rule-setting, but focus on how parents try to enforce the rules they set. Physical tools are both digital and physical and include things like using Internet filters or standing over a child's shoulder as means of enforcement. I describe both of these in this section.

4.2.2.1 Social Strategies for Managing Technology Use

Parents used a variety of approaches to enforce the rules and monitoring they wanted to have in place (see Table 4.2.2.1). Some parents monitored their children's Internet use by requiring password information to email or social networking sites. Some parents equated Internet use to books and movies. They would monitor the books their children read and movies they were allowed to go see, and in the same way

they wanted to be able to monitor the Internet content their children interacted with. Other parents required that their children friend them on Facebook so they would know what their children were doing at any time.

Some parents I talked to were more strict and heavy-handed. They monitored all Internet use, at least as far as they knew. These were generally parents of younger children (roughly ages 11 and younger). One mother set up her child's email to forward to her own email without him knowing it. Other parents secretly figured out their children's passwords and checked the accounts without telling their children. Almost all of the parents who told me that they checked on their children surreptiously appeared to be comfortable telling me that they did this, but they also assumed that I, the researcher, would be opposed to this kind of practice. Unfortunately, I did not think to ask them why they assumed I would be opposed during the interviews because I was focusing on how to make it clear I was not judgemental of their choices. They generally justified their approaches by saying that it was their right to know what their children were doing, and it was their responsibility to ensure their children's safety.

> *"I'm not sure that he knows I've searched his history. I also feel that some of those things of parenting, you don't have to tell your kids everything. You're not friends with them; I love them but it's my responsibility to raise them as safe, healthy, and independent adults."* -W15

Other parents were more hands-off, either by choice and philosophy or because they were just too busy to keep up with everything. They told me they periodically asked their children what they were doing, but admitted their children could be engaged in inappropriate activities or in trouble and they would not have any way of knowing.

Most parents did not check monthly cell phone bill logs to see how often or with whom children are texting because they felt it was too late at that point to do

anything about it. These parents were often the ones who instead set rules around grades and behavior and other easily measurable indicators. This indicates some of the challenges of handling the changing nature of Internet and cell phone use for parents. Even though report cards only came once a semester, parents used them as markers for reward and punishment. But cell phone bills that came monthly were far too outdated in parents eyes to impact daily and minute by minute future behavior.

Parents set rules about sites that were never allowed and others that were allowed with permission. Parents also used Internet blockers to limit the kinds of sites their children can go to. For some parents, specific websites were not allowed; for others, permission was needed and only appropriate sites were allowed.

> *"We have blocked access to all website that have not been approved by us. this is done by blocking all sites, then adding exceptions. We do it through the administrators' user account that he cannot access, so he cannot add sites on his own."* -P6

Parents limited or disallowed a number of social media sites, such as Facebook, YouTube, and Gmail. MySpace did not appear to be used among this demographic, at least to parents' knowledge. Internet for school purposes was acceptable (and pushing evening rules about how late technology could be used was also allowed for homework). Some parents of younger children required permission before their children visited any new sites at all that they hadn't yet approved. One parent signed a document with her children agreeing that the child wouldn't go on new sites without permission but in general, most didn't have a clear plan for how to enforce this kind of rule. Even with a social contract, their children could disobey and only be caught if their parents knew to check the browser history (and the child had not deleted it).

Parents who tried blocking strategies such as filtering and parental control software found them burdensome and ineffective and indeed such authoritarian approaches are

known from other research to invite circumvention [Byrne and Lee, 2011]. W14 set up a child safety tool but then *"nobody could search anything and I thought 'this is a dumb idea."'* W14 also foud searching history cumbersome. She and her son both had Dell computers but the process of searching history was different on his computer. W14 nonetheless felt confident about her success as a parent (she had three grown children and one teen) and remarked that she and her youngest son had a long-standing joke about her inability to play World of Warcraft. In another example, J3 had two laptop logins for his daughter. One had fun applications (e.g. Facebook, chat, etc.) and a timer. The second had only work-related applications and no timer. His solution was clean and clever for when she was younger, but at age 14 it was getting burdensom for him to have to log her in and out of them himsef. If she had the password, at age 14, she was prone to simply logging in to one and out of the other herself.

4.2.2.2 Technical Limitations and Parent Technical Competency

One of the challenges parents reported wass that they did not always understand and know how to use the technology their children were using. These gaps in technical competency could be disruptive. Parents' gaps in technical expertise–or the perceived gap between parent and child expertise (see [Hargittai, 2010] on "digital natives")–undermined parental authority. Many of the difficulties parents reported could be predicted by their levels of technical expertise. Parents who were technically savvy described more questions about deciding *what* rules to set and battles to fight; parents who were less savvy wanted to know *how* to set rules and enforce them.

Parents were then asked, on a scale of 1 to 10 (where 1 is lowest and 10 is highest) how much do you feel like you know about technology? Parents rated themselves slightly above average (mean 6.35, std 1.59). The most common rating was "7" (n=16) followed by "5" (n=11) (see Figure 4).

Table 8: Tools parents used.

Rule	
They are always on the computer in my presence, or in the next room - no closed doors.	P3
Uses the internet with a parent in the room.	P11
No unsupervised internet use.	P21
Internet use: Filter on computer; no YouTube; no Facebook.	P18
Older child has strict usage rules, limited text messaging, and I check text messages often and quietly.	P38
Parent present when searching internet.	P17
We check history of sites visited.	P6
With regard to the internet, we have severely limited the number of sites available to our kids. We have parental controls on the computer.	P4
Ask before they go to a web page we haven't previously approved.	P14
Just like we would monitor what book they read or movie they watch, we monitor what they do on the computer. I have her password; she gives it to me.	T27

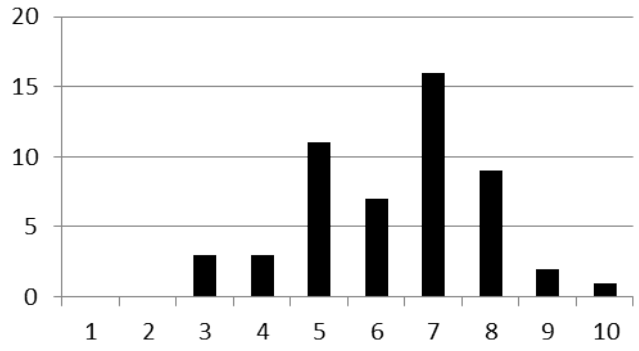

Figure 4: Distribution of parent's ratings of their own technology expertise.

Parents were then asked, on a scale of 1 to 10 (where 1 is lowest and 10 is highest) how much do you feel like your children know about technology? Parents rated their children almost 1.5 points higher on average than they rated themselves (mean 7.79, std 1.46). The most common rating was "8" (n=14) but another 18 were rated "9" or "10" and 17 were "6" or "7" (see Figure 5).

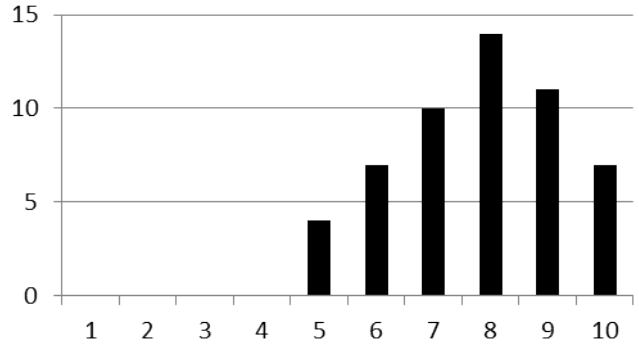

Figure 5: Distribution of parent's ratings of their children's technical expertise.

There was a moderate correlation between parents' ratings of themselves and parents' ratings of their children (Pearson r=.395, p<.01, n=53). The difference between most parents' ratings of themselves and of their children was "-1" or "-2" (n=28). Another 13 parents rated the difference between "-3" and "-6" (see Figure 6). 7 parents rated themselves as knowing more than their children and 5 rated themselves and their children as knowing the same amount. There was no relationship between grade of child and parents' ratings of their own or their children's technical ability.

Of the two fathers interviewed, one was very tech savvy and one was moderately tech savvy. The mothers I interviewed ranged in technical ability and interest but none self-described as heavy technology users.

> *"I knew you were going to ask this. My friend has got the program, I don't know what it's called. She says I should get it but I can't even read my own emails, much less my kids. I would say I'm more technically behind than my friends... My kids know more about their cell phones and computers*

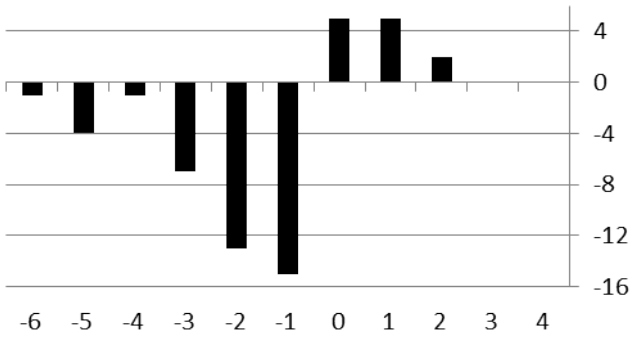

Figure 6: Difference between parents' ratings of themselves and parents' ratings of their children. X-axis is ratings of themselves-of their children

> *and anything tech than I do, more than their father does. They know that they do."* -S11

> *"You're going to have to forgive me because I'm not going to use the words correctly. I just don't understand it, that's the problem with it, I don't understand the way they communicate."* -W4

Among all parents there was a general awareness that they could not monitor or control everything their children were doing. S10's husband said their daughter could have Facebook if S10 asked for her "code–what is it called?" (though their daughter had subsequently joined Facebook and S10 has not yet gotten her password). S10 did check history on her children's laptops. She learned how to do this at the Apple store, initially not as a disciplinary tool but because she was trying to find something on her laptop. She appropriated it for monitoring because she found it so easy to use–she could hit a button and everything shows up.

One medium that parents had adopted to keep up with their children was texting. Parents learned to use text messaging because they perceive it to be the best–and sometimes, only–way to get a timely response from their teens. M3 texted her children when they were in the shower because it was the fastest way to notify them that it was dinner time. Parents texted their teens in the evening because teens could text

back discriminately while out with their friends. Many parents leveraged cell phones and the Internet as a privilege they can take away as a form of punishment.

4.2.3 Division of Labor: Determining who is Responsible

In an activity system, division of labor describes how tasks are distributed within the system. My interviews with parents revealed that they desired a community-oriented approach to managing and monitoring technology use. While parents felt it was ultimately their responsibility to parent their child in all aspects of life, they had varied views on the roles of schools (e.g. teachers and administrators) and government (e.g. texting laws) in the parenting process. The division of responsibility for monitoring and managing children's technology is complicated. This section describes parents' perspectives on the distribution of labor among parents, school, and government.

4.2.3.1 Parents and Family

Digital footsteps can leave permanent, archived traces. Parents worried that their children were going to say something or get involved in a conversation that could have devastating consequences. During one school incident, a student emailed an exam to other students and even the recipients who read it and didn't report it were punished. A sexting incident at a school also had parents of older teens concerned about their dating behavior and the kinds of photos that might end up online. One parent overheard her son's friend say to him "I saw a picture of your sister on Facebook; she and her friends were holding beers.' The parent was shocked, not so much because of the drinking which she didn't like, but because of who else might be able to see the photo. She was more worried about the publicness of the behavior than the behavior itself. Another parent shared her concern, after her daughter posted 'I hate school with a burning passion' when she was allowed to join Facebook. Her mother reminded her that her teacher, chaplain, and friends could all see it. What would they think. Most parents felt that it was their responsilibity to prevent such things

from happening, saying things like:

> *"You hear these things about kids who get in trouble, like sexting. If that were my kid I would feel I was partly to blame because I wasn't monitoring it. It's my kid, they're in my household, and they're young. It's my right to know what he's doing on the computer and I probably should be more on top of it."* -K4

One mother said her husband was very worried about the potential damage Facebook use could cause for their futures. One mistake with drinking or drugs on the computer could blow their whole future, a small mistake could have such a long-term outcome. For parents like this one, the concern was that their children often acted rashly, or acted first and thought about it later. But the outcome of these actions was permanent and they didn't think their children always understood that. Parents recognized that their children were developing and likely to make poor choices through adolescence, but felt the repercussions are more drastic. Parents noted that many of these fears are different and perhaps greater than those of past generations because of the permanency.

> *"When I was in 7th grade if you wanted to see a girl's bosom you just went behind the bleachers and the girl would flip up her shirt and show her bosom. This year, she texted it to him; everybody gets in trouble."* -S11

Middle school was a transition point in technology ownership among participants. When asked why they bought cell phones for their children, parents explained cell phones purchasing choices based on the need for communication, including coordination, convenience, and emergencies. P7 said her children must have the cell phone on during carpool so that she could reach her children. P9 also had a rule that the

cell phone must be left on during carpool. P32 said that the phone in the 6th grade was "purely for use between child and parent, with a very small amount of texting allowed with other friends." After school pickup was a common reason for purchase.

> *"The cell phone is typically used as a means of communicating to us (e.g. pick me up at the plaza instead of the lake, I forgot my instrument and will meet you in 10 minutes, etc.)"* -P37

> *"The cell phone we purchased does not offer internet access. It is for communication when we need it (after school, biking in the neighborhood, etc.). We haven't put any specific rules in place, as our child has used it reasonably."* -P27

Emergencies were often cited as a reason for purchasing a cell phone for middle school-primarily 6th grade-children. P23 stated that the cell phone is supposed to be for "emergencies" only. P15 said her 6th grader might get a cell phone for the child's birthday in October but only if grades were good. "It's more for parent convenience and can be taken away at any moment." P15 noted this was a rule for their older child as well. P37 had a rule about charging the phone but said their older child wasn't good at keeping it charged. The older child would lose the phone frequently and then find it with a dead battery and the parents would not be able to reach them. P37 felt this approach was not working well and was looking for suggestions. Finally, P13 had moved to the school recently and their daughter used it to talk to old friends but otherwise had little interested in it yet. It was primarily used to "communicate with either my husband or me."

Parents brainstormed a variety of ways that they might be able to learn about technology to keep up with their children. They leveraged extended network of siblings, cousins, aunts and uncles, and other parents to help keep an eye on activities. Three examples characterize the typical kinds of community and family support: (1)

F14 was friends with her teenage nieces on Facebook and quietly reported to her brother, a single working father, when necessary; (2) F12's middle school son was texting with a girl. She watched the conversations and alerted the girl's parents to some questionable texts the girl sent; (3) F17 was alerted to her son's behavior from another parent who said her son seemed like he might be depressed. F17's son had been posting "Nobody likes me" on Buzz and the other children were seeing it. Part of the challenge for parents was that they were behind their children technically and they knew it. This inversion of power was what made keeping up with their technology use so challenging. The challenge was greatest among parents who were least confident about their own technology use. I often heard them holding technology culpable when things went wrong.

4.2.3.2 School

Frequency of use was problematic at school as well as at home. Students wore hooded sweatshirts with front pockets and text in their sweatshirt pockets without looking at the cell phone, a practice which they did often and did well. The school had a rule of no cell phone use in the building and students looked for creative ways to circumvent rules. (This also led the school to ask parents not to text their children during the day because it created a tension in authority between parents and school policies). Parents felt that if the school administers laptops to students as part of a school program then the school should be responsible for monitoring what the students are doing on it, both at school and at home. Many parents wondered if the school actually did monitor students' use of the laptops.

> *"My first response is yes, they should monitor it. My second response is they don't have the manpower. I mean as a mom, it's hard enough to keep up with my kids' two laptops... I like the kids thinking that the school is monitoring it even if they aren't but I also think that ultimately it's my*

responsibility." -M3

Parents hoped that their children's school was ahead of the game with respect to technology. They hoped their children were being taught age-appropriate training on the computer and Internet, but they did not expect the school to be teaching everything. Some parents felt the responsibility was a shared one between parents and teachers:

> *"For computer ethics as well as moral ethics, I think teachers have a huge responsibility and I think parents do too."* -K4

Although parents were not sure if the school was monitoring their children's use (either at home or at school), they liked the idea that the school *could* be. In particular, they liked the idea that their children thought the school was monitoring them. In general, there were challenges that had not yet been resolved around Internet use at school and who should be responsible. I did not focus on school technology and social media policy in this dissertation. I was grateful for the school's support of my research, as described in the next chapter. However, I believe it is an important area for future work.

4.2.3.3 Government

Most parents were less enthusiastic about the idea of government monitoring their children, feeling that it was parents' responsibility to oversee their children. Government trying to compensate for bad parenting did not help. However, some parents agreed it could help to have laws to discourage children from doing something they shouldn't be doing. S11 questioned whether government could effectively put restrictions on children when they could not do it effectively with adults and pedophiles. J3 was most positive about government regulation:

"I'm a big believer, I really do believe that the government should regulate because once regulation is set up, you have boundaries, you have clear rules on how it is allowed to be used I think all things around content should be regulated, absolutely. It's too easy for kids to get to this stuff. I don't believe that self-policing in this case works." -J3

In general, I observed that parents who identifed as religious often identified many points where they wanted to be able to monitor or have more insight into what their children were doing on a daily basis. As described earlier, the demographics of the interview subjects leaned toward conservative and religious, which likely influences responses about regulation. These results differ from [Byrne and Lee, 2011] and suggest room for future work.

4.3 Chapter Summary and Design Implications

This chapter described parents' technical ability and rules parents set about home social media use. Parents purchased mobile phones for young teens for communication and emergencies uses. Yet, teens want mobile phones for social purposes and status [Ling and Yttri, 2005]. Thus, while parents purchased mobile phones for their middle school children for the purposes of convenience and emergencies, youth began to use them in their own ways. Parents perceived that youth knew more than parents about technology which made it difficult to parent effectively.

As technology entered children's lives, parents had to decide what rules to set around technology use in the home. I surveyed parents about their technical ability and asked them what kinds of rules they set around technology use. Following the activity theory framework, I organized observations by Rules, Tools, and Division of Labor. Table 4.3 shows a subset of key rules, tools, and stakeholders parents reported in the interviews. The results indicate the wide range of challenges and issues and tensions that parents grapple with. The results show the myriad ways that

Table 9: Parent rules, tools, and perceptions of community roles. n=number of participants.

Rules Parents Set	**N**
Technology use based on performance (e.g. grades)	14
Evening curfew for technology use	4
Establish etiquette rules (e.g. no texting at meal times)	9
Limit minutes of media time per day	6
Personal technology must be kept in public	5
Walk into child's room to monitor use	6
Tools Used	**N**
Purchase texting plan with evening cutoff	2
Create "work" and "fun" logins on computer	1
Take away technology as punishment	6
Check browser history	5
Require passwords be shared	3
Require Facebook friends	3
Install parental control software	4
Division of Labor: Who is Responsible?	**N**
Teacher	8
School administration	9
Other children's parents	6
Older siblings (aunts uncles grandparents)	7
Government	5
Coaches, pastors, etc.	2

Table 10: Design Implications.

Parent Wants	**Design Goals**
To keep up with social media	Be informative and high tempo
Help learning about new services	Provide textual and video how-to's; provide online and f2f support
To know what other parents are doing	Provide social support for knowledge sharing
Transparency of school policies	Link in school administrators and IT department

the activity of "technoparenting" is transformed with changes in social media use. In particular 1) parents wanted to be able to keep up with changes in social media so that they could more easily know what their kids were up to; 2) parents who had weaker technical ability especially struggled to figure out what their kids were doing; 3) parents wanted to know what other like-minded parents in their community were doing to manage social media use.

The results from the formative work suggest opportunities for helping parents through community-based support. Based on the challenges parents described, I developed a set of wants and desires that they expressed and translated them to design ideas for an online community-based social network for parents at the school I worked with (see Table 4.3). In the next chapter I present an online parent network designed to support parents in overcoming technical limitations and coming up with appropriate rules for social media use.

CHAPTER V

PARENTNET: AN ONLINE, COMMUNITY-BASED INTERVENTION

Drawing on the results and design ideas from the last chapter, I designed a school-based online social network called ParentNet for parents to support them in keeping up with technology and social media in their children's lives. ParentNet was designed to give parents a place to keep up with changes in social media and a platform to try out services like chatrooms. ParentNet was implementing building off an out of the box social network platform called Ning with JavaScript, PHP, and mySql extensions. Some ParentNet features mirror those of well-known social networking services like Facebook. I added custom features like grade-level privacy, school feeds, and back-end analytics for the research team. For over three years I worked with a private school in a large urban city in the U.S. The school had implemented a 1-to-1 laptop program among its middle school students (grades 6-8) and was interested in ways of further supporting parents. The demographics of the school and parents are primarily middle to upper class, and are generally economically capable of purchasing technology. My long-term partnership with the school helped me to gain trust among the staff and administration. The work described in this chapter could not have happened without their support.

5.1 Pilot Study

During the 2009-2010 school year I conducted a pilot study where 6th grade parents were invited to join ParentNet. This pilot was exploratory and experimental. By experimental, I mean that I was not yet fully invested in the school nor they in me.

The principal did not send out a recruitment email, for example (which she did during the full study the following year). I organized chat help-sessions, provided resources, and observed participation. The goal was to develop a set of design principles around which to redesign the network for the following year. Based on interactions with parents, teachers, and administrators, and observation of use, I redesigned ParentNet for the 2010-2011 year.

Yet, use of social media is deeply local, unique to cultural and school-wide trends. For example, in 2010, Chatroulette (an anonymous video chat website) became immensely popular among middle school students at the same time it was becoming a popular phenomenon nationwide. However, Google Buzz also swept through the school, which was a local trend. ParentNet was targeted towards this particular local community while following broader trends.

There are few educational resources for parents to learn about social media use, especially technical details like privacy settings and how to set up an account. Parents felt that resources online were detached from their own personal experiences. ParentNet was designed to teach parents about social media, as well as to engage them in using it. I helped form a high school "tech team" who acted as a junior research team with me to think about how parents of middle school children might want to use technology and how we might be able to teach them skills. For example, with this high school student tech team, I created short screen capture how-to videos of topics like how to view browser history and how to set Facebook privacy settings.

Parents wanted to know what the school's policies were in supporting management of social media use. I tightly integrated updates with the school administration and technology support team. They provided updates about the school technology policy (an agreement that students signed with their parents directing how they would behave online). The IT department also fielded questions about the extent to which the school was monitoring Internet use and tensions in who should be monitoring use.

5.2 Evaluation Process

I conducted four focus groups with parents at the conclusion of the school year (May 2011, one week before the end of the semester). Parents were recruited through emails to the middle and upper school parent mailing lists from the school administration. Two focus groups were conducted with 5-7th grade parents and two with 8-10th grade parents (parents with children in both grade groups were invited to join either group). A total of 28 parents participated. Quotes from the focus groups are indicated by "F" + parent number (e.g. F14). Focus groups were conducted at the school on weekday mornings at different times to align with child drop-offs. The focus groups were structured to complement the network, with a focus on rich descriptions and collective brainstorming about social media management at home. Parents were invited to walk through a day in their home life in the context of technology use and then to discuss and brainstorm challenges and approaches for managing social media use. The results from the online data, survey, and focus groups are supported by hundreds of hours that we spent interacting with youth and parents as well as school teachers, administrators, and tech support.

I combined network use with focus group data in the analysis below to show how parents navigate the complexities of social media management. I used a thematic analysis approach [Boyatzis, 1998] to organize focus group transcripts and ParentNet discussion transcripts into categories. I selected the most commonly recurring themes around parenting and technology use. I then returned to the transcripts and refined the themes using an axial coding approach. I present them in four sections: circumvention, monitoring, keeping up, and disconnecting. I describe these themes in the results and then explore theories about why we worry as well as social and design implications in the discussion.

5.3 Deployment

I deployed ParentNet again in August 2010, for the 2010-2011 academic year. The network was seeded with a team of resources, including middle school administration, school IT and technology administrators, and four students from the student "tech team" (see figure 7). I recruited parents by speaking at the school's opening parent night and one to one laptop information session. The middle school principal also emailed the middle school-wide parent email list inviting parents to join the network. After three months, the parent network has 133 members, 5 of whom were students from the upper school (grades 9-12) "tech team," 5 of whom were school administrators, and 2 from the research team. Participation in the network was mostly read only, where parents read about technology updates from the school and from the research team. I discuss this in the evaluation section.

The network contained a welcome message at the top for the first month (see Figure 8). Beneath it was a Forum page where the research team posted weekly items and members were also welcome to contribute topics. The Latest Activity was a news feed, showing new members, connections, forum posts, and comments.

The left column contained private groups for class of 2015, 2016, and 2017 parents (parents of 6th, 7th, and 8th graders during the 2011-2012 academic year). Below the Groups section was a Members section showing a subset of the network members. Content of the network included updates on new social sites and uses that were coming out (e.g. Google Buzz, Google+, Formspring), updates on technology policy and meetings from the school administrators, and discussions on social media use in the popular press. A blast notification email was sent to all network members every 1-2 weeks containing a summary of new content. Use as a result of these blasts is describe in Chapter 6.

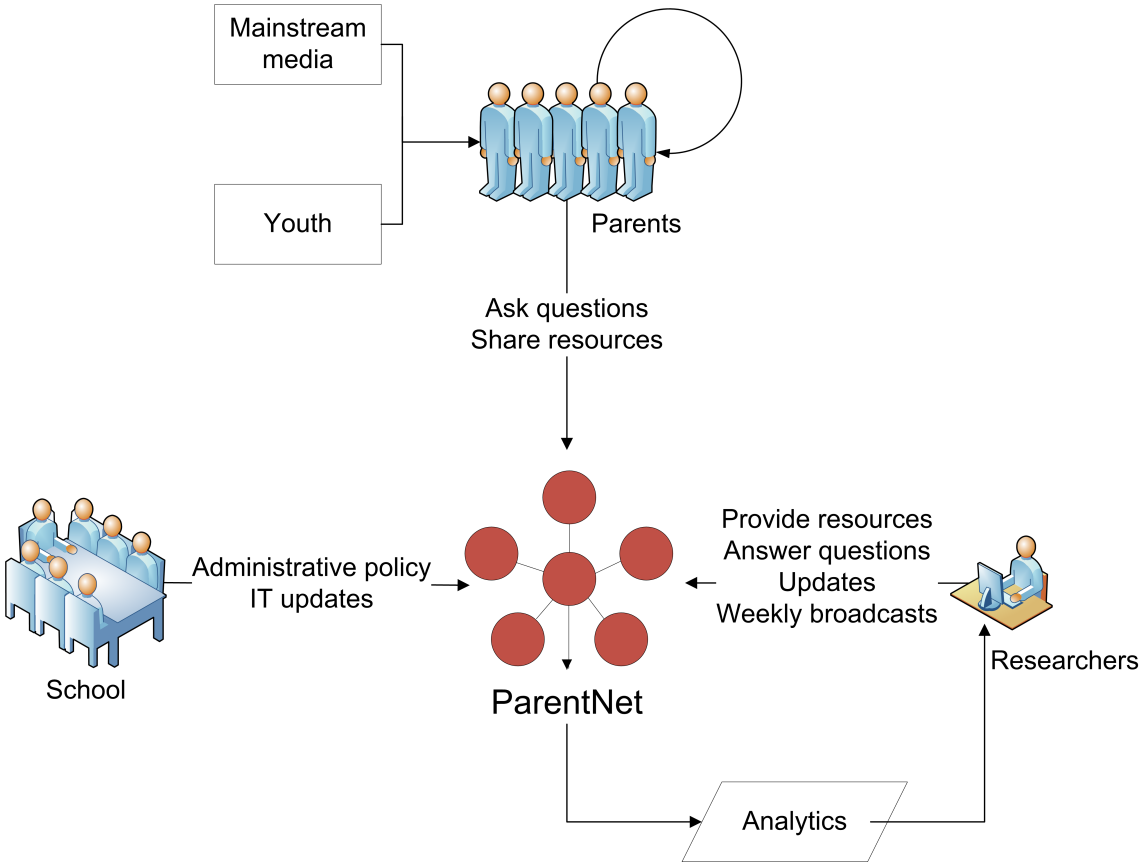

Figure 7: ParentNet flowchart.

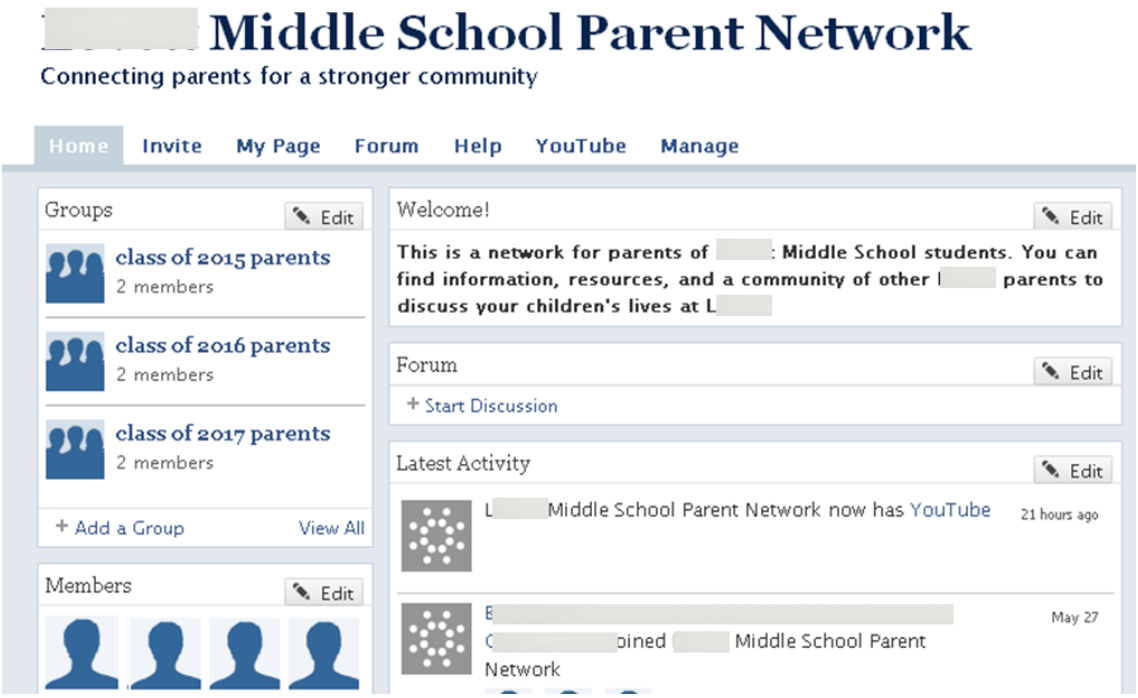

Figure 8: ParentNet screenshot (anonymized).

5.3.1 A Methodological Note on Working with Schools

There are many challenges to deploying a social media platform in organizations. For example, coordinating multiple stakeholders who are distributed across different locations can result in barriers in use Lampe and Roth [2012]. Schools, in particular, are complex social institutions. Although education research is common in schools, research conducted in and through schools is rarely seen in HCI and there is little guidance for how to do such research [Poole et al., 2011]. This is in part because of the hurdles in overcoming school policies and procedures in most cities in the U.S. Conducting research with youth already introduces particular challenges around access, child assent, and parent consent. The challenges of doing school-based research included working within school bureaucracy, acquiring administrative and teacher buy-in, and coordination within the structured walls of the school system. By this, I mean that schools follow rules and standards and often have little flexibility in how

they are carried out. The benefits have also been vast in my research. Researchers can attain credibility through affiliation with the school and access to students and parents. Researchers can also gain buy-in from school administration and teachers to support recruitment. The school also provided a central location around which to meet with participants. While I did not evaluate the effectiveness of a school as a context for HCC research, it is worth mentioning the context of my research to set the stage for conducting school-based online community interventions with parents.

CHAPTER VI

PARENTNET EVALUATION AND DISCUSSION

6.1 ParentNet Participation

In total, 130 parents joined the parent network, representing about 30% of the middle school parents at the school. The distribution was skewed towards younger parents, particularly parents of 6th graders. This group was new to the middle school, new to the 1-to-1 laptop program, and likely to be starting to think about buying their children technology like cell phones. Most parents joined the network within the first few weeks of its announcement. The network contained a welcome message at the top for the first month (see 9).

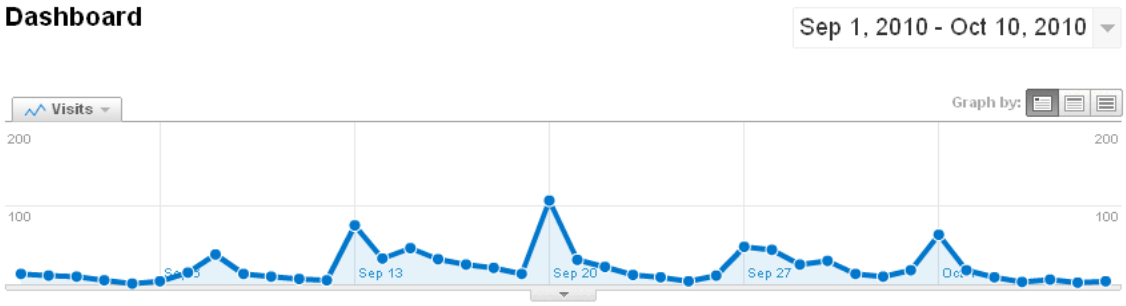

Figure 9: Traffic to ParentNet.

A blast notification email was sent to all network members every 1-2 weeks containing a summary of new content. The spikes in Figure 9 show network read patterns based on those blasts. In general, parents treated the network like a mailing list with a social presence rather than a social network. They joined, friended other parents, created profile photos, but read content without contributing much of their own. Instead they often shared feedback to the research team in face to face meetings and through the school staff. This indicates that they transferred existing behaviors–email

Table 11: Parent participation.

Joined	38% of total number of parents
Read	81% of parents who joined
Contributed	29% of parents who joined

lists from the parent groups at school–to the use of this new platform. This suggests that I could have done more to change the culture among parents and to better set their expectations for how ParentNet might be used.

6.2 ParentNet Use and Engagement

Use of ParentNet mirrored familiar patterns of participation online where a few parents contributed the most, many read but didn't post much, and some joined and did not return Lampe *et al.* [2010], Lampe and Roth [2012], Guzdial and Turns [2000], Nonnecke and Preece [2000]. The "1% rule" is also known as the 90-9-1 principle and asserts that 1% of people will create content, 9% will contribute, and 90% will lurk (though this omits people who join and rarely or never return). This pattern is seen on popular sites like Twitter where somewhere around 60% of users are estimated to join and then not return; MySpace and Facebook have somewhere around 40% who don't return [Cashmore, 2009]. On ParentNet, just over 40% of parents joined the site of the total possible number of parents in the middle school (though for most families, one parent in the family joined which makes the participation rate/family closer to 80%) (see Table 6.2). As mentioned earlier, ParentNet was advertised by school administration and I believe high join rates were due to school support as well as general interest in the topic of social media. After joining, just under 80% of parents returned to the site and about 40% returned weekly, usually after the weekly blasts were sent out.

During the focus groups, I asked parents about what they like and didn't like

Table 12: What Participants Liked on ParentNet.

	N=28
Keep up with changes in social media	24
Community engagement	18
Keep up with school technology policies and updates	22
Attention being given to the role of technology	16

Table 13: What Participants Didn't Like about ParentNet.

	N=28
Trying to spend less time with technology, not more	25
Not enough time	23
Too many platforms, hard to keep up	16
Prefer to talk face-to-face	8
Unclear what benefits are	5

about ParentNet.

Running a deployment means there is little control over external variables and I observed many such deviations in my field work. During the year that ParentNet was deployed, there were serious issues of sexting in the middle school and of middle school children being blackmailed into taking photos in compromising positions (by someone older and outside of the school community). As such, parents' attitudes

Table 14: What Participants Want.

	N=28
Effects of technology use (and overuse) to be more clear	17
Someone else to establish rules about technology use (which they can overrule)	20
Easier way to access information on ParentNet	13

about Internet use varied dramatically depending on how close or far their child might be to these kinds of incidents and simply depending on when during the year I talked to them. I discuss major themes from the content on the network and in focus group data in the next sections.

6.3 Themes and Discussion

6.3.1 Dealing with Circumvention

Children came up with creative ways to circumvent rules about technology use. Parents felt that it was a huge struggle to try to keep up with their children because of this circumvention. Parents in the focus groups reported that they knew their teenagers were doing many things at once but they never knew exactly what at any given time.

I looked to uncover the nature of the differences in what parents felt they knew. Some parents felt comfortable with their children's uses, especially parents who had taken the time to learn about Facebook or try out Skype chat as they told me in my discussions with them and online. Those who did not use the sites and devices their children's used were less able to vet activities. Their insecurity was evident in our discussions.

> *How do you know that your sons aren't on Facebook?* -Researcher
>
> *Well, I don't know. I don't know how you set up an account. Do you have to have a credit card and do you have to pay for it?* -F11
>
> *No. You need an email address.* -Researcher
>
> *Oh, well, they don't have email except for school, unless Can they use their school email?* -F11

Others felt far behind their kids, and that it was impossible to try to keep up. F14 created a Facebook account to that she could "go on Facebook and Google her

son" to make sure he did not have something under his name. F14 later found out that her son had a Gmail account which she asked him to get rid of. She opened a Gmail account so she could also "Google" to see if he had opened another account under another name. However, she knew her son's friends showed him how to set up fake names and email accounts on the Xbox and realized her efforts might be futile. Other parents shared F14's suspicions, knowing their children were technologically capable of getting around their restrictions. They were also socially capable; once one teen knew how to circumvent a restriction, they all knew.

For parents like F11 who did not use the sites and services that their children used, it was hard to know the ways that their children might be getting around any kind of rule they purported to establish. Indeed, the discussions on ParentNet suggested that while parents established certain kinds of rules, in practice they often enforced a less rigorous version of these standards. I heard this in the interviews as well; at the beginning of the interviews parents told me that things were going pretty well with their rulese but as we became comfortable, they told me about the challenges in enforcing them. Recognizing and intervening in technical circumventions was hard for parents and time consuming and they would sometimes openly admit it and sometimes just hint at it. This suggests interesting future work in face saving among parents and how much they are willing to share about their children's lives.

One example that parents often discussed with me was about how to check browser history. Parents had recently learned about private browsing and that their efforts at monitoring browser history had become futile. Many parents talked about checking history but it was much simpler in theory than in practice.

> *I gave up with private browsing on Mac awhile ago. I'd say, "Do not put on private browsing." Then I'd come in and it was on private browsing. I'm like, "Stop." But I have three kids and they all are like the family circus, "Not me! Not me! Not me!"* -F11

Parents recounted ongoing games of digital cat and mouse with their kids. Over my three years with them, I observed them learning to check browser history, then their kids learning to delete history, then parents learning that an empty history meant it had been deleted, then kids learning to delete select items, and finally learning to keep an open tab on private browsing with regular browsing kept public. Parents are currently wondering how to handle private browsing.

Parents wanted a better system for enabling laptop use in the room while retaining some amount of access to what their kids were doing. Kids could hear parents coming up the stairs and quickly switch out of their activity. Parents felt like nags if they were constantly policing their children, but they felt out of control if they were not checking them. In one typical example, F19 could see all of her 13-year-old's updates, photos, and wall comments on Facebook, but she could not see her 16-year-old's. She figured the older one had learned how to hide content from her or had a separate account. She looked at one of his texts one day and his friend had texted "Get on Facebook." While parents like F19 did not want to spy on their children, they wanted the technical ability to do so "just in case."

> *It's best to know their password without them knowing that you know their password.* -F10

> *Do you know something I don't? How?* -F9

> *I'm good. My son has this crazy matrix unlock thing on his phone that he thinks I don't know how to do. I just sat there and watched him one day and now I know it.* -F10

Parents' fears of not knowing what their children were doing had evolved over time. In the past year, students had created Gmail accounts en masse and quickly migrated over to Buzz together. Some inappropriate conversations took place on

Buzz, leading parents to first wonder how their kids had gotten to this service, and second, believe that Buzz (and Gmail) were inherently bad technologies.

> *That Gmail is just insidious.* -F3
>
> *Yeah. They all have it.* -F1
>
> *And if you make them get rid of it they create another one.* -F4
>
> *I mentioned the name of a little girl down the street to my son. He goes, "Oh, yeah. I follow her on GBuzz." I said, "Well, do you know her?" "No." It was bizarre behavior.* -F3

In this case, 6th grade students had been using Google Buzz inappropriately and parents blamed Gmail (which was the path through which the students found Google Buzz). Though the technology was just a platform for social behavior, it became the source of blame for how it was used.

Parents frequently determined technology's worth based on how their kids were using it. Whether or not the technology in itself was objectively good or bad was not of concern-how their kids used it determined its appropriateness. Formspring had also swept through the school, and parents had strong negative views about the site. When one asked what it was in a focus group, another replied:

> *It's this thing where you get on and you anonymously can make comments about people. So, it can get really nasty and downhill really fast because you don't know who's making these comments.* -F19

A third parent added that "It's just a bully site." Parents' strategies for handling their kids use often resorted to just trying to shut off access. Interestingly, parents observed that their children did not frequently send or receive telephone calls on their cell phones, they mostly used the cell phone for texting. When they needed to make a phone call to a friend for a homework assignment, they would pick up the home phone line and call.

6.3.2 Deciding How Much to Monitor Children

Parents held different views on whether or not to surreptitiously monitor their children (and indeed those who did assumed that the research team would be philosophically or morally opposed to surreptitious monitoring-"you probably don't agree with this"). Many questions that surfaced on ParentNet and in face to face meetings were about whether there were effective monitoring tools available for parents to use. F5 had set up SpectorSoft and could see her young daughter's AIM chats with a group of friends from camp, but found it incredibly labor-intensive to keep up with.

> *It is hard as a parent Everybody's busy. Not that we don't want to check up on our kids. We want them to do the right thing and we're trying to do the right thing. But it's just really hard.* -F18

Parents used Internet blockers to limit the kinds of sites their children could go to. For some parents, specific websites were not allowed such as Facebook, YouTube, and chat; for others, permission was needed and only appropriate sites were allowed. However, most parents did not rely on technology heavily because they found it unwieldy and difficult to manage. They similarly tried to block inappropriate sites but found it annoying to have to keep up with what sites should be blocked (and to have to unblock sites like YouTube every time their children asked).

Parents wanted a better system for enabling laptop use in the room while retaining some amount of access to what their kids were doing. Parents felt like nags if they were constantly policing their children, but they felt out of control if they were not checking them. For example, children quickly switched (Alt-Tab) out of an application if they heard their parents walking in the room or up the stairs.

While parents like F19 did not want to spy on their children, they wanted the technical ability to do so "just in case." Interestingly, parents did not report having moral qualms about children using laptops in their bedrooms. Rather, parents were

concerned that they had zero visibility into their children's interactions. Thus, parents designated "technology rooms," spaces that aligned with parents' existing daily routines (e.g. in the kitchen so a parent could watch while cooking dinner, or in the hallway so parents could see while walking back and forth). The bedroom was off-limits or semi-limited (e.g. before bedtime) whereas common spaces like the kitchen and living room were acceptable for use. Yet, rules were hard to enforce:

> *I don't know what I'm going to do about exams and all of that, because they say they can't all study in the room together. I can't go from room to room. I've got three children to get from point A to B to C. I have a hard time making it through the day myself, much less trying to deal with technology.* -F15

Parents sometimes caught their kids by looking over their shoulders; other times kids broke rules and inadvertently left digital traces that parents later found. F22's example was typical of many; her son lost his computer time when he tried to create a Facebook account. She caught him because he had logged in on her computer and she saw Facebook emails on his account. She then installed tracking software on the computers. F20 similarly found out her daughter had Gmail and told her she would be checking it from now on. At that point, no further emails were sent or received from the account. After a few days F20 confronted her daughter who admitted starting a new account which F20 again requested the password for. F20 took the phone away from her daughter for thirty days as punishment.

> *I can walk into a room and she'll click so fast. I said, "Julie, I see you changing the screens. What are you doing? Every time I walk in, you're on the same screen," which is, like, her schedule. So, I said, "I want to see what you're doing. I'm not leaving until you click it back." So, she clicks it back and she's on chat with like three other girls. I look into the*

screen and one of the girls waves to me, and the other one puts her head in her hands because she's been caught. I said, "Julie, can they see me?" I'm sitting here in my pajamas with a curler in my hair. She said, "Yeah, wave to them!" -F7

One example that parents often discussed with us was about how to check browser history. Parents had recently learned about private browsing and that their efforts at monitoring browser history had become futile. Many parents talked about checking history but again, it was much simpler in theory than in practice.

All parents who participated in the focus groups felt that their kids needed some top-down discipline imposed on them, though it was not clear what such discipline should look like. The problem for parents was that unlike other aspects of their kids' lives (e.g. diet, sleep, and exercise), what exactly that discipline (and corresponding freedom) should look like was largely unknown. Technology was new enough for parents that they did not feel like they know what they *should* be doing. This challenge was particularly salient for parents during middle school.

They need to be able to block all of middle school. It's too much. Their brains are too small to be smart about some of this stuff. You know what I mean? -F2

A computer is a lot of responsibility. -F16

It's an adult toy. It's an adult tool. To put an adult tool or toy into the hands of a child (and they're still children until they're fifteen, sometimes eighteen, depending upon the person) and expect them to behave like an adult I think is ignorance. -F18

Middle school was the main period of concern for parents. Parents whose children were not yet in middle school (5th grade and younger) said their children simply

were not using technology all that much yet. Parents of 10th-12th graders generally agreed their kids needed independence and to manage their own time. Many also mentioned that the topics of concern for them had moved from social media to others like drinking, sex, and college applications. Social media seemed most troubling to parents during the middle school years whereas parents of late high school students talked mostly about college and future plans.

6.3.3 How Parents (Try To) Disconnect from Technology

Parents diverged widely in how much time they spent using social media themselves. Some reported regular email and Facebook use, but most reported little use and only when they had time in their day. More commonly, they converged on the shared experience of not having enough time to keep up with what their kids were doing. Parents told us again and again that they just did not have the energy and resources to figure out what was going on. Both F4 and F11 were concerned about what they would have to give up in order to spend more time understanding technology. F11 similarly wondered how some moms could dedicate their lives to updating Facebook. F11 felt that moms who spent a lot of time on Facebook were making the wrong choice–sacrificing other priorities in order to be spending time online.

Parents had a sense that their children (and indeed, the whole family) is connecting to and through technology too much. But they don't know how much was too much. For example, most told us they thought their teenagers texted too much, but they did not keep track of how many texts were sent each month from the phone bill. Parents employed a variety of strategies to disconnect their kids from technology use. F12 observed her son "jumping from place to place" on the computer and made him print out his teacher's PowerPoint presentations and vocabulary words. For television viewing, parents tried a variety of disconnecting approaches:

> *I hide TV remotes all the time by the way.* -F3

Yeah. I've gone outside and undone the cable. I mean, our kids don't watch TV Monday through Thursday, but on the weekends sometimes I'll turn it off and tell them 'We lost our cable.' -F5

TV's really the least of my concerns Although, in the summertime, it's an issue. -F2

It's the stupid computers. -F4

I agree. -F5

Parents' strategies for limiting their children's Internet use sometimes resorted to just trying to shut off access at the router level rather than at the device level.

If you turn off the router, what does that do? -F8

You just unplug it. -F9

But what does that do? -F8

They can't get to the wireless. They can't get to the Internet. But just on the laptop. -Researcher

But can they use their cell phone still? -F8

Yeah. -F7

Can they still use their iPod and all that sneaky stuff? -F8

Despite the rhetoric of disconnecting, parents felt that approaches like disenabling the router or taking away the cell phone were difficult to enforce. Parents wanted access to the Internet at home for their own use so disconnecting the router itself was not sustainable. Taking away the child's cell phone meant parents could no longer reach the child throughout the day.

Some parents used Internet blockers to limit the kinds of sites their children could go to. For these parents, specific websites were not allowed (e.g. Facebook, YouTube, chat clients); for others, permission was needed and only "appropriate" sites were allowed. However, most parents did not heavily rely on technology as a proxy for parenting because they found it unwieldy and difficult to manage.

One of the stimuli for disconnecting was parents' uncertainty about the effects of multitasking. Again, they took steps to limit excessive media time, though none of them had a strong sense of how much was too much (research debates about the effects of multitasking remain unresolved [Davidson, 2011, Ophir *et al.*, 2009]. Although children said they could not study in the same room together, they were online doing multiple things at once. Parents were concerned about how multitasking was changing their children's social and physical development. For example, one parent said:

> *He was going back and forth and talking to people. It was too tempting. He would be sitting on the sofa for three solid hours. I'm saying,"There's no way in seventh grade you have three solid hours of homework." I would make him get up and go outside and do something because he'd get this look on his face like the waking dead or something.* -F11

Parents in the focus groups reported that they knew their kids were doing many things on the computer–Skype, Facebook, video games–but they never knew exactly what was being done. Many parents mentioned that while the physical television was rarely turned on on weekdays, their kids watched TV shows online while doing homework:

> *They're allegedly doing work on it. But it's too easy to flip over and watch. My junior is obsessed with all these different shows that you can just watch online. "No, I'm not watching TV, mom." But I can't see his computer*

screen. He's watching the latest NCIS or whatever in between his paper. He taps back and forth. -F7

Disconnecting from technology was a broader theme that surfaced in conversations with parents around their own uses of technology. Parents' acknowledged their heavy use of their technology throughout the day and that they were not likely to be modeling exemplary behavior. Interestingly, while they referred to ParentNet for local resources and conversations about technology and social media, they also complained that it was another place that they had to go on online and keep up with. We return to this in the following section.

One question that arises if parents are concerned about how much their kids use cell phones is why buy them phones in the first place, especially at an increasingly young age? Perhaps ironically, parents reported buying phones for their kids to make parent-child communication easier. Emergencies were often cited as the earliest and most compelling reason for purchasing a mobile phone for middle school-primarily 6th grade-children. Parents were busy and wanted to save themselves time by communicating with their kids real-time for coordination and convenience. Morning carpool and after school pickup were common reasons for purchasing phones, to accommodate communication such as "pick me up at the plaza instead of the office," "I forgot my instrument and will meet you in 10 minutes," "biking home today," etc. P7, P9, and F2 all required that their children leave mobile phones on during carpool so that the parents could reach them.

Parents of older teens and with larger families reported texting inside the house to communicate with their families. One mother texted her daughter to say dinner was ready because it was simply easier than going upstairs and interrupting her. Another texted early in the morning with her co-located family to communicate about the day's plans starting at 6:30 am: "Is it chapel day? Is chorus this morning? What time is the play-off game tonight?" Texting during the day was also common. Parents

knew that kids would have their phones off and receive messages as soon as it could be turned on (ostensibly outside of class).

It is also worth noting that age is an often overlooked factor in monitoring and spying rhetoric. My results indicate that the kinds of oversight parents want are vastly different among 10 year old children versus 16 year olds. Middle school was the main period of concern for parents. Parents whose children were not yet in middle school (5th grade and younger) said their children simply were not using technology all that much yet. Parents of 10th-12th graders generally conceded independence and autonomy to their children.

6.4 Chapter Summary

This chapter described ParentNet participation in terms of numbers and engagement. It also discussed broader themes that emerged through ParentNet and conversations with participants both online and offline. Themes that emerged revolved around difficulties in dealing with children's circumvention, decisions about how much to monitor children, why keeping up is hard for children, and how and why parents try to disconnect from technology. In the next chapter, I consider these topics among a different social group of parents.

CHAPTER VII

CONSIDERING PARENTNET USE AMONG OTHER SOCIAL GROUPS

This chapter describes differences in how parents manage technology use among two demographics of parents. The work described in early chapters centered around middle and upper income parents. I wanted to explore if a service like ParentNet would be useful or even relevant to low income individuals from different backgrounds. This chapter begins an exploration of these questions by comparing interviews with low income parents to those of the middle and upper income parents.

Demographers have long predicted that a dramatic shift would take place in the racial makeup of the population in the United States. This prediction came to fruition in early 2011. Data from the 2010 Census Bureau revealed that fewer than half of current three year-olds in the U.S. are Caucasian [Frey, 2011]. As they grow up, this generation of American youth will be over 50% minority. In other words, the rising new racial makeup is and will continue to be a minority majority.

At the same time, economic inequality is increasing in the U.S. The income gap between the richest and poorest Americans is the largest it has been since household income was first tracked in the 1960s [Bureau]. In 2011, 15% of Americans and 22% of American children live below the poverty line [Bureau]. In past decades, economically less advantaged individuals were arguably less relevant for HCI because computers were predominantly used only by the wealthy. Today, this has changed. Among families making under $30,000 per year, 59% have computers at home and 75% have mobile phones [Smith, 2010a]. Taken together, these two trends mean that the typical HCI user is less and less likely to be white and middle class. To confront this

emerging design space, I interviewed 18 low income parents in the Atlanta area. Prior research shows that low-income populations tend to have different family structures and different technology purchasing patterns; yet, little is known about how these differences impact technology use. The questions I focus on this chapter are: does technology access and use differ across different populations, and, to what extent are these differences pushed to the forefront by socioeconomic conditions? The goal of this was to consider ParentNet relevance among a different demographic and more broadly, to explore ways that HCC research should broaden its vision of the normative user.

7.1 Reflection on the Process

When I started this research I was eager to explore how a different social group dealt with parenting and technology use in the home. This turned out to be one the most contentious and complicated projects I've ever worked on, and I didn't anticipate this or particularly enjoy it. With that said, this was also the one where individuals came up to me and said thanks for doing this more often than any other project. People were upset about the way I discussed race, income, class, or any combination of these. Race is rarely discussed at a conference like CHI, and I can see why researchers might be loathe to address it fully there. It is also the case that I have many ways to learn about how to better study and address these topics. Indeed, if my goal is to design technologies for parents, I believe I shouldn't ignore the culture and class that the parents come from. Unfortunately in HCI research, this is often ignored (perhaps briefly addressed with a table reflecting gender and ages). Researchers have focused on difficult topics like homelessness and technology in developing countries, though there is often (though not always) a division between builders and studiers.

I feel that part of designing and evaluating technologies for families and parents will have to address these kinds of issues. One of the things I would do differently is

to present this study as a descriptive portrait of a particular demographic and the use of technology in family life. A comparison study became problematic in the inevitable "othering" of a social group.

While my future goals are to build technologies to support parents in handling technology and social media in the home, I feel I still have to address class. As my research continues, I expect to be working with parents from a variety of regions, from inner city to urban to suburban to rural. These parents will come from a broad range of backgrounds and cultures, and will have a broad range of incomes. At the conclusion of this chapter, I'll return to lessons I've learned during the Ph.D. process and how I plan to address these issues in future work.

7.2 Related Work

To orient readers around this work, I first draw on research from Family Studies, Sociology, and large surveys to describe family structure and technology purchasing and adoption patterns. I then describe how this work builds on prior HCI studies of income and other demographic factors as they relate to technology use.

7.2.1 Technology Purchasing and Adoption

Differences in technology use exist among various families and cultures. This section briefly highlights comparisons of technology ownership and use by race, income, and geography. These are just three factors of many that could relate to variations in technology values and use. Devices and services whites own or use more than African Americans [Smith, 2010d,b, Horrigan, 2009]:

- Own desktop computer (65% vs. 51%)
- Go online using a computer during a typical day (59% vs. 45%)
- Have Internet access (50% versus 36%)

- Have broadband Internet (67% vs. 56%)

Devices and services African Americans own or use more than whites [Smith, 2011a,b, 2010a]:

- Use Internet only from mobile phones (18% vs. 10%)
- Use social networking sites (70% vs. 60%)
- Use mobile devices to play games (51% vs. 29%)
- Spend more time playing video games (1 hour 25 minutes/day vs. 56 minutes/day)
- Spend discretionary income on video game hardware ($260 vs. $219/year), software ($123 vs. $114/year)

Devices and services high income families (>75k) own or use more than low-income families (<75k) [Jansen, 2010]:

- Use the internet on any given day
- Own multiple internet-ready devices
- Manage money and access news online
- Own desktop computers (79% vs. 55%) and laptop computers (79% vs. 47%)
- Own game consoles (54% vs. 41%)

Patterns among urban, suburban, and rural Internet users:

- Rural users have 1/3 as many friends and comments on social networking sites as urban users [Gilbert *et al.*, 2008]

- Urban and suburban users own smartphones at twice the rate of rural users [Smith, 2011a]
- Urban and suburban users have similar frequency of use of online ads and video sharing sites
- Urban residents are more likely than suburban to use their mobile phones to play games, use social networking sites, or watch a video [Smith, 2011b]

In general, African-Americans are the most active users of the mobile Internet and their use of it is growing the fastest [Horrigan, 2009]. Their heavy use of mobile devices offsets lower levels of access through traditional devices like desktop computers, laptops, and home-broadband connections [Horrigan, 2009]. African Americans spend more of their discretionary income on computers, cell phones, and other electronics than any other group. They remain somewhat less likely than whites to go online but the gap has decreased over the past 10 years [Smith, 2010a,c].

7.2.2 Studies of Relevant Social Groups in HCC

Recent work in HCI and HCC has increasingly focused on factors like race and income in technology design and use. Research that has examined low-income demographics include Woelfer's studies of homelessness and technology use [Woelfer and Hendry, 2010] and Dillahunt et al.'s studies of energy use in low-income communities [Dillahunt *et al.*, 2009]. Work that has examined race includes Grimes' series of studies which focused on eating patterns among African-American populations [Grimes *et al.*, 2008] and DiSalvo et al.'s studies of young African-American male game practices [DiSalvo *et al.*, 2011]. However, these studies of technology tend to focus on a particular demographic rather than a comparison of two demographics. Comparison studies are difficult to do because technology deployments are often designed for a particular demographic and recruiting does not scale well if looking for two disparate types of

participants. A notable exception is Ames et al.'s comparison study of screen time among working class and middle class families with young children [Ames *et al.*, 2011]. They argue that socioeconomic status and class are important, yet overlooked, categories in HCI. They find that middle-class families restrict television and computer use whereas working-class families promote technology to their children.

I build on their work but focus on two new directions: 1) comparison of low-income, urban parents and middle-upper class, suburban parents; and 2) study of families with pre-teens and teens (ages 10 and up).

An overwhelming proportion of children get their first cell phones and online accounts during the middle school years [Lenhart, 2010] and thus, I focus on this disruptive and transformative stage in families' lives. As others have done [Taylor, 2011], this research problematizes a design process where the normative user is assumed to be white and middle class. The growing body of work on low-income and minority groups' use of technology reflects the research communities' interest in understanding users beyond white and middle class.

7.3 Methods

Participants were geographically split between north and south Atlanta. Atlanta has a rich history of diversity and struggle, and is representative of the diverse racial, ethnic, and economic backgrounds described in the introduction. In this study, the middle and upper income parents are the those described in earlier chapters who in general live in North Atlanta. The low income parents in general live in South Atlanta. References to specific families are Family number + B or A to refer to high or low income.

I partnered with local community programs to recruit low income parents. Program I was a program for African-American teen boys to learn computer programming

skills. They had to be qualified as low income as defined by the federal Free and Reduced Lunch Program. I interviewed five parents from Program I. These interviews took place in a mall food court, at Burger King, over the phone, and at a coffee shop.

Program II was a nationally recognized after-school program for youth with multiple sites in Atlanta. I visited two sites over multiple evenings and multiple weeks to interview 13 parents. I recruited by setting up a desk near the entrance and exit and inviting parents to participate while they were picking up their children.

Interviews ranged in length of time from 15 minutes to one hour. Short interviews were in instances where parents were in transit while picking up their children and neither I nor they wanted to interrupt their day for too long without a prior scheduled appointment. I tried to recruit Program I parents for interviews but found it difficult to get them to return my phone calls or emails and thus resorted to the strategy at Program II. The interviews with low income parents were shorter than those with the middle and high income parents on average. In future work, I hope to do more in-depth observation and deep hanging out with this demographic. I did not pay participants in Group B or Group A, which is likely to have affected my recruitment and interview format.

I asked parents first about who was living in their home, then about what kinds of technology were there. As the interview progressed and parents became more comfortable, I asked about what kinds of rules they set at home around technology use, and what they found easy or difficult in enforcing such rules. All interviews were conducted in English and all participants were native English speakers.

Program II was a nationally recognized after-school program for youth with multiple sites in the city of my study. I visited two sites over multiple evenings and multiple weeks to interview 12 parents. I recruited by setting up a desk near the entrance and exit and invited parents to participate while they were picking up their children.

Table 15: Participant demographics.

	Low Income	**High Income**
Participants		
Mother	15	14
Father	3	2
Family Size		
1 child/family	3	0
2 children/family	8	2
3 children/family	5	7
4 children/family	1	4
Participant's Children		
(Total) Girls	20	22
(Total) Boys	18	19
Children's Ages		
<8	8	7
8-11	13	9
12-17	10	17
>17	7	8

Among the seven feeder schools into Program II, five have over 90% eligibility for Free and Reduced Lunch (FRL). FRL is determined as a proportion of the Federal Poverty Guidelines (income has to be under 130% of FPG for eligibility for free lunch and 185% for reduced lunch). For example, for a 5-person family the FPG is $25,790; thus, families with an income less than $33,527 are eligible for free lunch and less than $47,712 are eligible for reduced lunch.

I used a thematic analysis approach to guide my data analysis [Boyatzis, 1998]. I coded transcripts for high-level codes related to parenting, technology, and class. As I iterated over the interview transcripts and high level codes, I broke these codes down into more detail, such as:

- parenting-strictness, values, rules, monitoring
- technology-ownership, access, use, purchasing

I coded the interview transcripts again with the detailed codes and looked for high-level themes to emerge among Group B and Group A interview transcripts. I refer to both parents and guardians as "parents" for simplicity, but note that the term parent may be more representative of some demographics than others.

7.4 Results

In general, the amount of use of technology and the appropriateness of content exchanged present challenges for parents. However, the exact form of those challenges differs in various ways.

7.4.1 Rules and Monitoring

Parents wanted their children to have cell phones to facilitate communication with parents and for safety and emergencies. High income parents usually wanted their middle school children to be able to coordinate after-school pick-ups and carpools real-time. Some low income parents wanted their children to be able to communicate

when they took the bus to school or from after-school activities. Parents across demographics had similar approaches to rules about how their younger children (middle school and younger) could use social media.

Most of them looked to limit the amount of time their children spent on computers and mobile devices. Some parents limited television to a certain daily time limit or no TV at all during the week. A mother in Family 30A expanded the policy to include Facebook as her children grew older, though her children were upset that Facebook was not allowed. Her children shared a desktop between them (and she had her own desktop and laptop for herself). Though she had wanted to get them laptops for Christmas, she did not because she felt it was inviting more issues with Facebook. Her older son had Internet access on his cell phone so he could check Facebook anyway but she felt that cell phone use was different than a computer monitor, where people could chat for hours. The following quote from her was representative of many I heard about immediate families' use of cell phones:

> *It got to the point where they would email each other in the same house at the same time. They be emailing each other, he's upstairs, she's downstairs, the child's in another room.*

Parents recounted stories of other children's parents calling them to tell them that their own child was engaged in inappropriate behavior. In one case, a parent had learned her child was writing that "nobody liked him" online and another girl told her mom who called the parent. In another case, a parent received a phone call from a father of an 8-year-old girl who said her 12 year-old son was playing games and chatting with the girl online late at night. In this case the girl had given the boy her home phone number and he called; the parents had callerID so they called the parent, who was previously unaware of his son's late night gaming and chatting.

Cutting off the Internet was a frequently used strategy for parents, though they accomplished this in different ways. Parents often did not have the right language

for conveying the decisions they made. A parent in Family 11 told us she "cut off the Internet, for a long time." When asked how she did that, she said she "closed the laptop and took it downstairs." A parent in Family 14B, when asked the same question about how the computer turned off at 8:30pm, she could only say that "It just shuts off." High income parents were more likely to tell us that they explicitly relied on other community members like parents and schools to help monitor and keep an eye on their children; however, this is likely in part because the school was private and tight-knit.

Parents across demographics reported that it was hard for them to keep up with what their children were up to. They assumed their children knew more than they did about technology:

> *I have shut Facebook off completely because they were still going downstairs. If I go upstairs, where the kitchen and all that is, I can't see what they're doing. They were spending too much time on Facebook, so my computer friend showed me how to go in and block it. I just locked it within the last two weeks. They haven't said anything; I don't know if they've figured out how to get around it.* -Family 16A

Parents were familiar with checking history as a tool for surveying their children's browsing activity. Many parents had tried blocking Internet use. A parent in Family 15A told us that she and her husband had blocks on their Internet browser. Her husband checked history and could tell that it was being erased. A mother in Family 22 reported the same experience:

> *How do you know where they've been?* -Researcher
>
> *I look over their shoulder. Sometimes I go back into their history but then they got real smart and they'll erase it as soon as I get up...*

How do you know? -Researcher

When I check there's nothing there.

How did you learn to check history? -Researcher

From classes I've taken. From operating a computer myself.

Parents told us they had taken classes to learn about computers, though where they accessed classes varied. The local Apple store was a source of information for some high income mothers whereas local community centers were sources for some low income parents.

Most parents knew that their children were likely to be hiding search history in some way, especially as they got older. The low income parents also knew that their children were using private browsing (which means history is never logged and cannot be viewed later). In contrast, low income parents I talked to did not mention private browsing and only a few mentioned deleting items from history. However, I observed that information tended to spread quickly and widely through parents at the high income school and, thus, they often knew and were concerned about similar things. In both cases, parents acknowledged that their children probably knew how to circumvent whatever rules they were setting up. Most parents were looking for effective ways to monitor their children's activities. Some wanted to monitor all the time, others just wanted the ability to monitor if they felt it was needed. Few families reported that their children were likely to tell them what they were doing.

There were some examples where low income families did communicate more openly. One example indicates how family structure relates to attitudes towards technology. A low income woman in her 50's was raising three of her nephews, the youngest of whom was a senior in high school. She became the legal guardian of the boys when they were 8-13 years old and the difference was discernable in the

ways that she had raised them with respect to technology use. She gave them more freedom because they were not her own children. She also communicated with them more openly, and they with her, at least according to her:

> *I never had any kids of my own and I worked a lot. When I got them it was like one day I didn't have kids, the next day I had a bunch. I've heard some of my colleagues say they use Facebook to check what their kids are doing. My kids just tell me; sometimes it's too much information. Maybe it's because I'm their aunt and not their mom, I've always tried very hard to be not judgmental. If they bring it to me I try to be objective and show them why this is really not cool to be doing. So anything that they do, I basically already know.* -Family 10A

This is just one example where communication styles were driven by the nature of the family relation. This suggests opportunities for more work looking at communication styles between parents and youth and family structure.

7.4.2 Sharing Devices

My results suggested that low income families are more likely to share devices like computers and cell phones than high income families. Low income parents reported that sharing posted challenges for them, such as the logistics of trying to share computer time. Parents were annoyed when children downloaded software and that slowed down the machine or when they changed settings. Some parents had rules about time of use, such as if children went over on their allotted time, the time would be taken from the next day's allotment. In most families, parents had their own computer(s) but children sometimes shared devices. In general, parents felt that sharing computers made it easier for them to monitor what their kids were doing on the computer.

Sharing of other technologies, like phones, also made it easier for parents to know what was going on. Most children of high income parents were given mobile phones

around middle school time, at which point they no longer used the home phone line. For families who did still share phones, the sharing enabled parents to more easily "catch" their children. In Family 24A, the oldest son did not have a cell phone and a female friend called their home line at 4am. The son's parent intercepted the call before he could get to the phone. This transpired because he did not have a cell phone, but his female friend did, and thus imposed her own social protocols on his home landline. In Family 21A, a grandmother, who was the guardian of her grandchildren, caught her granddaughter's inappropriate sexual conversations after sharing a cell phone with the granddaughter. The granddaughter had borrowed the cell phone for a few days and the boys' texts kept coming. In these kinds of cases, shared devices left traces.

In contrast, high income parents rarely shared personal desktops or laptops with their children, especially once the children reached middle school age and older. When parents decided their children needed a computer and a cell phone for homework and communication, respectively, high income parents chose to purchase devices like laptops and cell phones for their children. I did not hear any parents say that they shared their devices with their children before purchasing children their own devices, though sometimes young children shared computers with one another. For high income parents, middle school was when their children began to get their own devices and services (e.g. Facebook accounts). For these parents, transitioning into this new stage of parenting was a difficult and sometimes exhausting process.

How parents used technology also impacted their children's uses. Family 17A consisted of a single mother of two young children who had gone back to school and did not have time to watch her daughter on the computer:

> *I'm really strict with her with the computer because she likes to explore places where she shouldn't. So she can only get on it if I'm going to be sitting there with her but that's really difficult because I use it for school.*

-F22A

She was working a job and also going to school for a post-secondary degree. In her home, as was the case in many homes, the shared computer was for the parents' work first, and the children's play second. Parents felt that young children-roughly 5th grade and younger-didn't need computers for school work; computers were mostly for fun and play. Parents in both groups believed middle school was about when computers time should be allotted in the evening for homework.

The sharing of devices among high income parents revealed important differences in participation. High income parents were more likely to purchase their children individual laptops and cell phones around middle school while low income parents either prioritized sharing of existing household devices or passing down old ones to the children, (though certainly some purchased devices for children like high income parents). Some low income families shared passwords for their email accounts, Facebook, and other online logins. One parent told us:

> *I have access, everybody has access to everybody's passwords. We have to have access to all passwords, Facebook, email, anything that is online.*
> -F2A

When asked how her children felt about it, she told us "They are okay with it." Another participant said she was friends with her children on Facebook. When asked if they were okay with it, she responded "Yeah, they don't have a choice." Many Group A parents replied in similar tones, emphasizing their parental authority:

> *If they're using the computer in their room too much, we say something: "Why are you going to your room to use the computer? It's a laptop. Sit down here." You know, so, we don't allow too much private use. If we see a pattern of someone always wanting to go to their room, then we stop it.*
> -F11A

And they're okay with that? -Researcher

They don't have a choice. I don't know if they're okay with it. It doesn't matter. -F11A

Such responses like these were common and reveal the more authoritarian approach to parenting that has been described in earlier studies of parenting among some low income communities [Nelson, 2010]. They can be more strict and demanding of their children, and reported this approach to us confidently. A grandmother of two teenagers told us she checked what the children were doing on the computer "whenever she felt like it." For her, privacy was a philosophical approach that undergirded day-to-day decisions in their home. When asked if they knew she was checking, she laughed and told us: "There's no such thing as privacy for them. They don't have privacy. We're just a very free-flowing kind of not uptight kind of family." -F14A

7.4.3 Responsibility

Low income parents consistently talked about responsibility as an important part of raising their children. Part of responsibility included getting a job as soon as teenagers were old enough, and transitioning towards independence as an adult, at age 18. In contrast, high income parents rarely discussed jobs or economic independence (though that is undoubtedly a long-term goal they held for their children [Nelson, 2010]). These parents were more likely to talk about education and extracurricular activities-sports, music, and camps-than the low income parents. An outcome of the emphasis on jobs and income among low income participants was that low income teens sometimes purchased their own devices, like games, and in those cases their parents and guardians granted them more agency over their uses. In Family 25A, an aunt who was guardian of three boys gave the youngest, a senior in high school, freedom with his laptop because he had purchased it himself. She didn't like the

amount of time he spent on it but didn't feel it was her authority to tell him what to do it with it because he owned it. When I asked how he paid for it, she replied:

> *He bought it. He has money because when their dad died they received money every month until they were 18–a portion, a income, and I would give it to them every month because I thought it was only right. I find when kids don't have money to buy the little things, they tend to get into negative behaviors. I feel that at a certain age your parents are done. It gives you an opportunity to be on your own.*

Her philosophy had worked well for the older children she had raised but she was having trouble with the youngest one, who had just turned 18:

> *He spends an exorbitant amount of money on these games. He went out and bought with his graduation money, part of it, a flat screen TV. I'm talking a 42" flat screen TV and put it in his room. So you know 'where's your money for your [college] room deposit'? Busted...*

Her oldest boy had purchased handheld games and her middle boy purchased new cellphones, but for both she never felt it was an addiction. In contrast, she felt her youngest was addicted to the Xbox and at age 18, it was becoming his responsibility to take control of his future.

Getting a job and earning potential was important at an earlier age for low income parents. A mother in Family 19A lamented that her teenage son spent his time playing games with a neighbor instead of getting a job or planning to go to school.

> *Lately, he's been going to another friend's house, guy that lives two doors down, they grew up together, and they play that game. He doesn't have a life either. He's about 21 years old, living in his mom's basement, and working at a McDonald's, not there's anything wrong with that, working*

at McDonald's is an opportunity. That guy has gained like 50 pounds, you can tell a young life going nowhere.

In Family 13B, the mother had gotten her oldest son a cell phone when he was in middle school but she took it away because he was using it too much. She got him one again for this 16th birthday. Her rule was that if she got any calls from school about him using it there or they confiscated it, he would not get it back. She did not want him using it during homework but knew he probably had it on vibrate and felt at age 16 he needed some leeway to use his own judgment.

Both high and low income parents talked about taking away cell phones as punishment. Most parents felt that their child was their responsibility and there had to be consequences to actions. Taking away the cell phone was a supreme punishment for children, and parents of all backgrounds appeared to be relieved to have at least one reliable leverage point over their children.

7.4.4 Economics and Status

Many of the public schools attended by low income children did not have working computers with Internet, and the local library was instead used as a computer and Internet resource center. The low income local community also had parent centers available where parents could go to use the Internet. Parents' attitudes towards technology and educational opportunities varied. A Family 22A guardian lamented the fact that other parents thought it was more important to have cell phones than to have Internet service at home. For many families, there was status associated with having a "nice, shiny phone" that could take pictures and have Internet service rather than a home computer and Internet to do homework.

Status and stigma were associated with different devices and influenced purchasing decisions for families from all backgrounds. Low income parents told us their children did not like prepaid cell phones because there was a stigma against them:

It's just considered an amateur phone. In the same way they might like Michael Jordan more than New Balance. It's a status symbol. -Family 8A

Phones like the TMobile and the Virgin Mobile both fit under this stigmatized category whereas the Blackberry and iPhone had higher status. Some low income parents put their children on flat-fee plans like MetroPCS because they were worried about high cell phone bills. Low income parents were concerned that their children would go over the monthly limit and they would be billed for their teenagers' heavy use. Low income parents were also concerned about their children breaking devices, in part because they did not always have the financial resources to easily replace them. High income parents were concerned about amount of use of cell phones as well, but their concerns were often related to the health and well-being of their children around excessive technology use.

The economic realities for low income parents were that they had to make choices about what devices to buy and what services to pay for, especially during economic downturns. I spoke to a low income participant who had worked at a neighborhood public library for over 20 years and who described the changes in patronage as the economy fluctuated:

Most of these people had the equipment before the economy went bad and the laptops, WalMart just about giving them way, people get their income tax, they go buy a laptop... It's incredible how many people do not know how to use the computer, how many people who were pushed out of the work force don't know how to do a resume. -F14

At that particular library, patrons–up to 20 at a time–would come to the library before it opened and sit in the parking lot to use the wireless. Many low income participants had laptops, or cell phones, or broadband, but not all three. Though they had some access to devices and Internet, they were hindered-especially lower

income people-by the lack of a fully participatory engagement with technology. This was also the case for adults who were unemployed and could not look for jobs from home.

Results show that sharing of devices, financial responsibility, rules and monitoring, and changes in the economy relate to the ways that families use technology. The implications of these patterns are discussed in the next section.

7.4.5 Limitations

The studies in this work are a non-representative sample. In Chapters 4-5, I wanted to study socio-technical parenting among a demographic of participants who had regular access to computers and the Internet. The demographics of the school are not representative of the average school or average family. The families are middle to upper income in the U.S. and most can easily afford computers and Internet at home as well as smart phones. Parents who agreed to participate in this research were not likely to be absentee or delinquent parents, and were likely to be generally active in the school community. The research in Chapter 7 focused on low income parents. These parents were also not likely to be absentee or delinquent parents and a sample bias existed among them as well. This dissertation focused on two particular populations but many of the themes are likely to be representative of a broader demographic of parents in the U.S.

7.5 Discussion

These results show that income and family structure can impact the way families use and interact with technology. Other parts of technology use and parenting span demographics and backgrounds. High income parents were more likely to purchase devices for their children around middle school for communication or educational purposes. Low income parents had to make more choices about products to get and what services to pay for on top of them. Thus, while reports that the digital divide

has narrowed accurately reflect increased access to the Internet among low income families, the ways that participants access the Internet differ. Low income families have more mobile devices and fewer desktop technologies, and thus still lack the full range of access that high income families have.

Low income families share devices more often, which can make the parenting and monitoring process easier for the parent. On the other hand, high income families tend to be two-parent and have at least one parent who is technologically literate. These families are better equipped to make informed decisions about how their children should be interacting with technology. In addition, low income parents who are single parents or guardians may be constrained by first order priorities in their lives like inflexible work schedules, single parenting responsibilities, and ensuring food, shelter, and safety are satisfied first and foremost. Managing and monitoring social media use are secondary concerns. Among these families, teenagers are often encouraged to get jobs both for the income source and to prepare them for future employment. Teenagers with jobs and purchasing power can wield more independence from their parents in deciding what technology to use and how because they own their devices. These secondary effects suggest new design directions that embrace cultural values, parent literacy, status markers, and presentation of self in technology use.

7.5.1 Supporting Parent Literacy

These results show that 1) most parents have cell phones across demographics; 2) time and being able to be on the go for parents are primary design constraints. Parents did not appear to have differences in terms of worldviews or moral panics about technology more generally. Some parents were pessimistic about the changes technology was bringing upon society and others were optimistic about the social and learning opportunities afforded. Most parents conveyed some amount of concern that their family was using social media too much. Adolescence is already a disruptive

and transformative stage in parents' and teens' lives and social media introduces new challenges. There is a need to educate parents about social media. Such digital media literacy could come in the form of school and community-based classes or in online resources. Thus, some design opportunities are shared across demographics, such as mobile phone services where parents can reach small bits of information on the go-while waiting in carpool or at the dentist office. In this case, the goal is to provide parents with manageable sized bits of information about social media in their children's lives.

However, while the issues are the same, how to address them within each group is different. Dual parent households often reported that one parent was the technical person and the other was less so (and this was often gendered). For single-parent families, the sole parent's ability to manage social media use was only as good as their knowledge of social media. For such parents, tools for quickly and easily keeping up with and staying on top of their children's behavior are needed. They need to be more lightweight and easy to use than existing monitoring software. They also should be less invasive of children's every move online, because neither parents nor children want such levels of surveillance.

Some families were more likely to share devices than other families, and the extent to which parents controlled devices varied by age and ownership. Older teens had more control over the devices and teens who bought their devices were afforded independence. In both cases, technological maturity is needed as teens gain ownership over their technology. As in other transitions like driving, teens know how to use the tools, but their decision-making about what to do with them can be under-developed. Teens are taught about social media in schools but more resources are needed for parents to know how to teach their teens age-appropriate decision-making skills around technology use.

7.5.2 Status and Purchasing Choices

Cell phones and video games are consistently purchased over desktops among low income demographics. These devices offer entertainment, connectedness, and status at relatively affordable prices. However, lack of computers, Internet, and productivity software makes schoolwork and job searching difficult to do from home. Different social groups want devices that not only are pleasing for them to use, but that elicit status from their peer groups. Status has always been a lynchpin of adolescence but it is also a marker of class (e.g. socioeconomic status, education, etc). Whereas families who are not economically constrained can choose to have certain styles of technology and not others, low income families typically have to make choices.

An important factor that was also surfaced in this research is that class is dynamic. The use of the public library highlighted the wide swing that the economic downturn caused in library patronage and kinds of use. Some families had laptops but no home broadband, and others had broadband but only to connect to video games. The library was a central hub for computer access, wireless, and entertainment (movie rentals). I emphasize that it is not possible to determine in this research what is attributable to various features of class like race, income, education, or neighborhood from other aspects of participants' lives. None of these can be detached from the larger milieu in which participants live ([McCall, 2007] explains intersectionality, or how socially constructed categories do not act independently of one another). Mobile and social computing technologies that offer communication, entertainment, social status, and education benefits compete for scarce dollars. I feel strongly that work is needed to understand these tradeoffs among various social groups and how to design for multiple, changing priorities among families and their technology purchasing choices. I think there will be implications for how families access educational and economic opportunities.

7.6 My Role: Designer, Researcher, Non-Parent, Middle Class, "White"

This research takes a microsociological approach to a macrosociological problem. It looks at things like parenting and technology–microsociological units–with the goal of understanding class and possible gaps in participation–macrosociological issues. This approach has a number of drawbacks. There is a tendency to concentrate on the unfamiliar and frame it as the first order object of focus. This is the case in this work. Although two groups are compared as is done in an approach like comparative ethnography [Bell *et al.*, 2005], this work really examines an emerging majority minority group in relation to the status quo that has dominated HCI and HCC research [Bardzell and Bardzell, 2011].

This work turned out to be very difficult for me to write about. I wanted to know if a platform like ParentNet would be effective or even useful for a different demographic than the demographic I deployed it with. The answer is likely no because this social group has different priorities and cultural values that impact technology use and choices. However, there are many challenges in interpreting the data in this research and in understanding what biases may have come out in participant responses. Orne described this difference [Orne, 1962]:

"We have a suspicion that the demand characteristics most potent in determining subjects' behavior are those which convey the purpose of the experiment effectively but not obviously. If the purpose of the experiment is not clear, or is highly ambiguous, many different hypotheses may be formed by different subjects, and the demand characteristics will not lead to clear-cut results. If, on the other hand, the demand characteristics are so obvious that the subject becomes fully conscious of the expectations of the experimenter, there is a tendency to lean over backwards to be honest."

A study from Dell at al. [Dell et al., 2012] showed the influence of social and demographic characteristics between researcher and subject in qualitative interviews.

Such an environment is subject to a type of response bias known as demand characteristics. These are biases in which participants adjust their responses based on what they think the interview wants, or expects, to hear [Orne, 1962]. Specifically, in Dell's study, respondents were about 2.5x times more likely to prefer an artifact built by the interviewer and about 5x times more likely if the interviewer was foreign and required a translator. While Dell's data came from Western researchers conducting research in India, their work inevitably points to the challenges in conducting research among social groups who are–or appear to be–different than oneself. My research differs from Dell's in some ways. First, participants in their study knew which artifact they had designed and thus felt obligated to choose that artifact when asked which they preferred. In my research, I did not pose questions as this or that choices, but instead as open-ended questions.

In all of the interviews I conducted, I presented myself as an academic researcher at the School of Interactive Computing at Georgia Tech. Thus, they all knew me as a graduate student at Georgia Tech, a university that appeared to be generally highly respected by the parents I interviewed in Atlanta. In terms of appearance, I likely appeared to them to be a white, middle class academic researcher. This would be only somewhat accurate. I consider myself middle or middle-upper class given my education and training and upbringing. My appearance is slightly misleading. As mentioned earlier, I'm half-Australian and half-Indian but raised in the U.S. As such, my childhood was culturally different than other American families and I sometimes felt like an outsider. I have occasionally met half-white, half-Indian children who I feel a bond with, but otherwise I generally don't identify very strongly with a particular social group. Nonetheless, I look like and engage in similar activities as the middle and upper income families I interviewed in Atlanta. In terms of parenting styles and my own upbringing, one of my parents was very strict–authoritarian–and the other was not at all. This does surface a limitation in my interview study in that whichever

parent I talked to will have colored the results of the research if both parents don't take similar approaches to parenting.

I know that parents sometimes wondered what my opinion was, or if I was expecting to hear something in particular, but in general I truly did not have a pre-formed opinion. I simply wanted to know their experiences. Thus, parents may have been engaging in face-saving behaviors and giving me responses that they thought I wanted to hear, but I suspect there wasn't a sweeping bias like in Dell's work, because parents simply did not know what it was that I might want to hear. Nonetheless, the results of this research are contextualized in an implicit set of values about what is right and desirable in terms of parenting and raising children. There are also values prescribed to technology adoption and its use in the home. These value judgments are inherent in any HCI study, but often fail to acknowledge the wide range of values that might exist across demographics.

One of the most interesting areas of focus in fields related to my research is that of politics and power structures. While my interpretivist stance puts me on the order end of the order-radical change spectrum, power and hierarchy are fundamental to any study of parent and child relationships [Burrell and Morgan, 1979]. As such, awareness of explicit and implicit power structures is critical. These power structures can emerge in the object of study, as well as in the relationship between the researcher who is filled with biases and value systems, and that which the researcher is studying. Although power structures can very much be reinforced through theories of regulation, order, social cohesion, the lens through which I often view power in my research is one that looks to privilege *both* parents and children as first-order participants with agency in their own lives. These are difficult and deeply rooted social forces to address.

HCI research has a tendency to report observable characteristics like age and gender but ignore subtle cultural stereotypes like conversation style. The class and culture I identify with is different than that of the participants with whom I was

interacting. As such, there is an in-group and out-group formation [Brewer, 1979, White et al., 2009], though power dynamics may vary fluidly depending on the number of researchers and participants and the nature of the research. In studies such as mine, researchers will identify with the race and education level of one group more than the other; yet, choices in conversation style, attire, and interview location can mitigate some of those differences. In cases where the authors are surrounded by participants of a different race, the power structure may be inverted.

When I met with parents whose children attended a private school I made an effort to dress like them and communicate in their style. They valued education and afterschool activities and I emphasized my interest in both. I met at locations of their choice which was usually the school their children went to or a coffee shop. I wore khakis or black pants and ordered coffee if they did. When I met with low income parents, I again met them at locations of their choice, such as Burger King. I typically wore jeans and a t-shirt and ordered fries or a beverage. Most of those parents also valued education as well and they appreciated my affiliation with Georgia Tech. My goal was to help parents feel comfortable in the interview environment and to mitigate differences between us. I also looked to report on their values and choices in how they use technology in their life. Values vary among different cultures and classes and I tried to acknowledge and encompass those in my collection, interpretation, and reporting of results. My hope is that because I was a non-parent asking parents about their experiences, I was also, in some ways the "out group" from their perspective. This balances the perception they had of me as an expert in technology and social media. I openly clarified that I did not have any children if I sensed that they were wondering, and I tried to encourage them to openly discuss their experiences with technology in an environment where there was no judgement for technical ability or parenting approaches.

7.6.1 Power and Intersubjectivity

Categories, social roles, and labels are dynamic. Understanding these facets means imposing frameworks on participants in order to place them in analytic categories. Researchers from a wide range of disciplines have wrestled with the use of race, in particular, as a scientific, socially constructed, and cultural categorization (and indeed, critical race theorists examine how researchers themselves participate in the social construction of race) [Kaplan and Bennett, 2003, Gunaratnam, 2003, Anderson, 1993]. Challenges include distinguishing between race as a risk factor or as a risk marker and finding a way to write about race that appropriately treats the we/they dichotomy [Kaplan and Bennett, 2003]. Scholars also ask how to make sense of accounts in which race is silent or non-manifest [Gunaratnam, 2003]. [Anderson, 1993] warns against research inquiries that privilege the perspective of dominant group members. Andersen also warns against examining the experiences of minorities by holding them up to a set of norms that come from the dominant group or from any group different than their own.

Inherent in interdisciplinary research is an implicit articulation of a set of values and expectations about what is right and desirable, such as status, class, income, education, family support, and opportunities for upward mobility [Ames *et al.*, 2011, Xu *et al.*, 2008, Bardzell and Bardzell, 2011]. At the beginning of this section I wrote that this work was hard to write about. Through conducting this research, receiving feedback in peer reviews, and in the dissertation process I have thought through how it could have been stronger. If I were to conduct this research again, and in future work I plan to do, I would improve my approach in these ways:

- approach my research questions through the lens of understanding the values of a particular social group and then framing their technology use and purchasing around their self-reported values.

- The question of how to capture values and face-saving techniques among parents is a methodologically challenging one and will have to be thought through in future work.

- I would also partner with a scholar in Family Studies, Sociology, or Critical Studies. To treat these issues appropriately in my own work (and for any HCC researcher who has to acknowledge these topics among her users) I can benefit from collaborating with scholars who can help guide the research questions and interpret the results appropriately and sensitively.

- Pull from ICT4D literature and discussions. Although they are focused on developing countries rather than low income populations in the U.S., they have considered issues around intersubjectivity, power, and post-colonialism in the context of human-centered computing research.

7.7 Chapter Summary

In this chapter, I examined differences in family technology use. I showed that family structure, technology ownership, and technical expertise impact the ways parents and children adopt and bring technology into the home. I also considered broader implications for doing research in human-centered computing and moving beyond the normative user in the design process. This chapter contributes new insights into how families from different backgrounds use technology and proposes a broader definition of the normative HCC user. This chapter was published in Yardi and Bruckman [2012].

CHAPTER VIII

REFLECTIONS AND FUTURE WORK

In this chapter, I revisit my research questions and describe my contributions to HCC. I then reflect on social and design implications and future directions for my research. Finally, I summarize the contributions of this dissertation and argue for the importance of supporting parents as well as broader populations in managing and setting boundaries around technology use.

8.1 Research Questions Revisited

The central thesis of this dissertation has been that parents can effectively manage their children's technology use, but their ability to do so will depend on the resources, technical ability and engagement, and social structure available to them. To investigate this thesis, the guiding question has been *how do parents manage their children's technology use and how can they be supported to do it better?*

RQ 1: What strategies do parents use to manage their children's use of technology? RQ 1a: What are the challenges and opportunities they face in doing so? To answer RQ 1, I conducted an interview study with 16 parents in the Atlanta area. I used a thematic analysis approach to develop categories around parenting and technology. The results of that work are reported in Chapter 4. I found three high-level socio-technical strategies that parents used:

1. Parents set rules around norms and expectations for technology use. They set boundaries around time of day that technology be used, they tried to impose limits on the frequency of use of technology, and parents of younger children

especially required that location of use be in public spaces in the home.

2. Parents also used tools to monitor and manage technology use, such as viewing browser history, Internet filters, and cutting off a cell phone plan in the evening.

3. Finally, the work of managing youth's technology use was distributed between parents, schools, and government laws but parents wanted finally say in how to raise their children.

RQ 2: How much do parents feel they know about technology and how much do they feel their children know? RQ 2a: What questions do they ask and what rules do they set with respect to managing their children' technology use? To explore RQ 2, I complemented the qualitative results in Chapter 4 with a survey of 53 parents' attitudes towards technology and self-reports of their technical competency. My results showed that:

1. Most parents bought cell phones for their children in 6th grade, with the next highest grades being 7th then 5th.

2. Parents rated their children 1.5 points higher on a 10-point scale on technical ability.

3. When setting rules about technology use at home, parents have questions about: time (e.g. when devices can be used), location (e.g. where devices can be used), website content (e.g. appropriateness of YouTube), communication (e.g. picking up after school), monitoring (e.g. sharing passwords), etiquette (e.g. cell phones at the dinner table).

RQ 3: What characteristics affect social media adoption or rejection among parents? RQ 3a: To what extent does a community-based online

intervention positively or negatively affect attitudes? To explore RQ3, I designed and deployed an online social network for parents called ParentNet to help them keep up with changes in technology 5. In the evaluation in Chapter 6, I described participants, site use, and successes and failures of the site. I found that parents have existing attitudes towards technology and use of the site related to these attitudes as well as to time constraints. Specifically, they liked the content and direction of the site but struggled with yet another site to keep up with. ParentNet also surfaced themes about dealing with circumvention, deciding how much to monitor children, and disconnecting from technology.

RQ 4: In what ways do parenting strategies and challenges vary among different social groups; specifically, low income and middle and upper income parents? The studies reported in Chapters 4-6 were with participants who were mostly high income. To explore RQ4, I conducted an interviewed study with 18 low income parents in the Atlanta area. I found that parenting of technology use varied across different backgrounds and family structures. Specifically:

1. Low income parents had to make more choices about products to get and what services to pay for on top of them.

2. Low income families have more mobile devices and fewer desktop technologies, and thus still lack the full range of access that high income families have.

3. Low income families share devices more often which makes the parenting and monitoring process potentially easier for the parent.

8.2 Contributions to HCC

This dissertation has provided new insights into the opportunities and challenges in conducting HCC research with a particular demographic, parents and youth. The

results of this dissertation build on existing knowledge by showing how parents set boundaries around time of day, frequency of use, and location, and what kinds of tools and social support they leverage to do so. They also show the ways that parents are limited or empowered by their own technical ability and the ways that an online social network can support them in keeping up. Finally, they show that family structure, device ownership and sharing, and status and choices dictate differences in technology use among different socioeconomic statuses. The contributions of this research include 1) empirical studies of how parents manage youth's technology use; 2) the development of a community-based online intervention; and 3) empirical study of how parenting varies by income. I have also described some of the challenges in conducting this kind of research: namely, gaining inside access to a school and parent community, encouraging adoption of an online platform, and addressing topics around income and class.

A number of researchers, including myself, have focused on digital youth [boyd, 2007, Ito, 2009, Boyd, 2008, Livingstone and Helsper, 2008, Livingstone, 2002, Lenhart *et al.*, 2010, Kennedy *et al.*, 2008]. I strongly believe that supporting constructive uses and open communication around technology among youth also relies on the parents and broader community. "Parent" and "parenting" are in themselves value-laden constructs; there is also far more work to be done looking at ways of supporting youth who have guardians, negligent parents, malicious parents, or no parents at all. Indeed, among some cultures and socioeconomic statuses, raising youth is left to aunts, uncles, grandparents, and other extended family guardianship networks and I believe a lot more can be down to understand growing technology use among these family units.

Setting boundaries around technology use can be an important mechanism for learning, self-control, and reflection; however, understanding the impact of technology requires a vision where people are in control of the devices and services they use rather

than the technology being in control of them. I have demonstrated here the challenges of maintaining such a vision when fears about overuse and misuse are pervasive, especially among a vulnerable population like youth and a concerned population like their parents. The social life of technology at home takes on new meanings as devices become more ubiquitous across life stages, from baby to elder.

Parents in my research fully appreciated the educational, occupational, and social benefits of technology in their children's lives. The challenge they faced was that they didn't know how to manage what they saw as unfamiliar and uncertain activities, like constant texting and late night gaming. The challenge for researchers is that we don't yet know the long-term benefits and costs of technology use, or overuse. Most people agree that excessive screen time (whether social media or television or video games) at the expense of sleep and physical activity and other daily needs has negative consequences, but little is known about the effects of moderate screen time, if any. This research surfaced the areas where parents felt ill-equipped to effectively establish rules about their children's social media use given their uncertainty about what their children *should* be doing. This suggests social and design opportunities where human-centered computing research might be able to start to address some of the questions and challenges surfaced in this work. Future research agendas should consider both the social implications of technology as they related to privacy, monitoring, disconnecting, and connecting, as well as design implications for supporting extended family connectedness and boundary setting.

8.3 Design Implications: Design Ideas for a Digital Window

In this section, I consider new design directions for future work. One design idea is a conceptual digital window based on ideas of social translucence. Social translucence is an approach to designing digital systems that emphasizes making social information visible within the system without making information fully transparent [Erickson and

Kellogg, 2000]. Erickson and Kellogg's ideas for social translucence were to support workplace interactions through visibility, awareness, and accountability [Erickson and Kellogg, 2000]. Yet, many of their ideas translate to the home. Parents want visibility into their children's interactions with technology. Translucence suggests that social information can pass through diffusely, allowing significant information to be surfaced but filtering out private details that carry little additional information. The goal would be to surface visibility to parents without compromising agency and autonomy that children need to develop into self-dependent adults. One vision for such a framework for thinking about parenting and technology is through the lens of what I call a "digital window." A digital window would make socially significant information visible by surfacing relevant information and filtering out details. Such a system might include router-level firmware that tracks activity by device, and a home visualization that displays family level use and interactions, like home energy or health monitors.

The architecture of a digital window for "technoparenting" has analogues in the physical architecture of the home. While mobile technologies have changed the conceptual nature of "space," as articulated by Harrison and Dourish [Harrison and Dourish, 1996], some properties of the home are still very much locked in place. Parents can see when friends come and go and who the friends are. Earlier generations of communication technology-like shared landline phones in the kitchen or a family TV in the living room-enabled much of this visibility (although circumvention was common, e.g. dragging a shared landline cord into the closet). Cell phones and laptops are personal and private [Ito *et al.*, 2005], increasing the tension between parents' desire for geolocators and tracking and children's desire to take advantage of this new kind of independence.

One way for a digital window to enable awareness is by surfacing relevant information through social activity indicators [Ackerman and Starr, 1995]. Activity

indicators and awareness cues can be built into a digital window to surface socially salient information [Erickson and Kellogg, 2000], such as when children are using technology and who they are using it with, and to trigger unusual behavior like late night chatting or language that parents deem inappropriate. However, awareness can be asymmetric [Voida *et al.*, 2008]. Some parents want children to know their online behavior is being watched; other parents want to watch surreptitiously, waiting for children to make a mistake and expose a "teachable moment." Much of the parenting process as it exists now involves parents watching children and making sure children know they are being watched, in order to motivate desired kinds of behavior.

Yet, parents recognize that privacy is important for their children. Care should be taken when designing a digital window that it strikes a balance between parent authority and child autonomy. "Just as in shared physical spaces–seeing that two people are chatting (without knowing what is said) can convey useful information without necessarily infringing on their privacy [Erickson and Kellogg, 2000]." Not surprisingly, children don't want to share their passwords and all online activities with parents. Indeed, parents may not need to hear everything their child does or says, as long as parents have some idea of what children are doing, with whom, and for how long. This extends the results in this dissertation beyond the focus on how parents manage children's technology use to how to empower both parents and children to become stewards of their own technology use. A digital window incorporates disconnecting into the design, but aims to give users agency and control over their devices rather than letting their technology control them [Carr, 2010, Fullerton, 2010, Leshed and Sengers, 2011].

There are a number of other design scenarios for supporting families. Parents like the idea of an "electronic basket" where children (and adults) can place their phones, iTouch, and other mobile devices for certain periods of time. Results also suggest that families may benefit from a "nutritional guideline" for technology use. Like the

USDA's ChooseMyPlate.gov for food choices, families could use recommendations as guidelines for deciding how to consume social media. Parents take away the cell phone, iTouch, or other devices as a bargaining position and punishment, and this was the one thing that children really did not want to give up. Yet, cutting off access is neither a realistic or productive approach for empowering children to learn to manage their own technology use. A dietary metaphor acknowledges the benefits of social media in people's lives–social support, connectedness, access to information and knowledge–and encourages consumption to those effects. However, like food, sleep, and work, moderation is needed. Guidelines can be useful frameworks on which to adopt and refine technology use practices in the family.

I would also like to design systems for connecting immediate and extended families. Teens and parents are Facebook friends with their extended families, including siblings, grandparents, aunts and uncles, cousins, and other relatives. There are untapped opportunities for fostering family interaction through shared interests and across geographical and age boundaries. Mainstream media perpetuates a tenet that parents and children can not be in the same spaces online. I would like to explore ways of opening communication channels within immediate and extended families that change some of the existing "get off my lawn" [Bruckman *et al.*, 2010] paradigms of online family interaction. Some avenues for positive outcomes are 1) children teaching adults about technology like Facebook and Skype through use of the platforms (experiential learning through teaching); 2) small groups of parents and children together developing collective mutual awareness and agreeable social media policies for families (cooperative economics); and, 3) adults and elders becoming digitally literate and gaining social support through maintained and new relationships online. I would like to think about new kinds of mobile systems to explore how people can connect to their extended families and local communities. There are a number of national priorities that could be addressed in this work around education, health, civic engagement,

and digital literacy among these populations.

8.4 Social Implications: Changes in Parenting and Dispelling Fears

Parental monitoring predates technology. In the Victorian era, courting took place at the girl's home under the watchful eye of her parents. A single girl was never allowed outside of the house by herself, particularly not in mixed company. However, social norms and expectations evolve with societal changes. Parents sometimes take away or limit technology as punishment or reprieve. We as a society know little about what the right balance is for children and technology use. Whereas topics like bedtime, mealtime, and playing outside have generations of precedence, activities like texting in bed, surfing a smart phone during meals, chatting while studying, and playing video games do not. Developmentally acceptable norms change, making it difficult for parents to know when to acquiesce to requests for individuality and self-regulation, and when not to. It is also difficult for parents to explain why rules are set the way they are when parents themselves may not know.

The findings from my research both reinforce and refute Turkle's notion of alone togetherness [Turkle, 2011]. Parents did indeed observe their children staring at devices at home instead of interacting with the family face to face; however, in my research, parents reported few fears about their children's emotional detachment–they were not so concerned about their children's underengagement because of technology, they were concerned about overuse of technology. In fact, laptops and cell phones have probably enabled more socialization than ever among children who are physically confined to a home space but digitally unbounded. Where technology introduces new factors into the parent-child equation are publicness (recall the father who publicly shot bullet holes in his daughter's computer), permanence (posting it on YouTube and Facebook mean it exists forever), and pervasiveness (laptop and cell phone mobility mean we're never disconnected). Thus, while some of parenting is the same as it

has always been, technology extends challenges in different ways–and as others have suggested, it seems that children and family dynamics are changing dramatically because of it.

Some parents wanted the school to help them bear some of the burden of keeping up with technology changes. They wanted the school to make decisions about what children should or should not be doing, but wanted themselves to have full authority to accept or veto such decisions. For example, the school might say students should not be on Buzz until a certain age, the way the school openly asserted about Facebook use. This way parents were equipped with a line of arguments such as "school rules say no Buzz until age 14." Parents thus did not have to explain why the rule is what it is, just that the school says so, (but importantly, parents still had the right to overrule when they want to).

The parent network patterns of use revealed that parents wanted information and resources, but they wanted it fast, without having more time sinks in their busy days. In addition, they did not usually want to have to reflect on social media use; they often just wanted to know what to do and when. There are a number of opportunities for distributed parenting based on these results. One opportunity is mobile applications that fit the lifestyle of busy parents. They could see and share bite-sized updates while sitting in a carpool line or waiting at a dentist's office. Traditionally, rule setting and monitoring has been largely done in the home under the purview of the parents. This amounts to an incredible amount of labor for parents. Connecting geographically local or similar parents can help them draw on other parents, older siblings and extended family, and schools.

Theories about collective bargaining can be leveraged to encourage parents and children to meet in the middle in deciding appropriate social media uses. Research has shown that when children find it hard to talk to their parents about the Internet, they tend to disagree *more* more with their parents about technology rules (such as

monitoring, use, etc.) [Byrne and Lee, 2011]. Collective bargaining consists of the process of negotiating between two parties (often employers and employees, but in this case, parents and children) [Simkin and Fidandis, 1986]. The goal is to give children the opportunity to influence rules in their environment and to have some control over aspects of their lives.

Childhood has always involved the process of risk-taking and gaining independence and autonomy from parents. While children do not always respond well to their parents' rules, they often respond to other parents' rules in other parents' homes. If all children accept the same rules, such as collectively giving up cell phones at a certain time, they are more open to the idea. When their friends are not online or texting, there is no fear of missing out. In addition, if they have some say in establishing the rules, they may feel more empowered and responsible for their own actions. Collective agreements would put forth conditions of social media use generated and agreed upon by groups of parents and teens, with an eye towards being socially acceptable among all stakeholders.

8.4.1 Why we Worry about Technology

Why do we worry about technology? This dissertation sheds light on the kinds of worries parents harbor–that their children are circumventing rules about technology use, that they should be monitoring their children's Internet use more than they do, and that they need to be keeping up with new social media trends. But why do these worries surface, especially among families who haven't experienced anything to worry about beyond normal child development (making friends, school, etc.)? Latour proposed the idea of *instant revisionism* to explain how we develop theories about the ways of the world [Latour, 2004]. Problematically, he says, as soon as something surprising or dangerous happens, we look for a quick explanation, as in the parent who said "That gmail is insidious."

We see societal reactions to technology like this on a daily basis. If a story about a child committing suicide after being bullied on Facebook is pushed through mainstream media, society–including parents–looks to explain why this happened and how to prevent it happening to their own child. Thus, decades of theories about children, relationships, and parenting are quickly revised into instant theories about Facebook and its negative effects. Mainstream media is also sensationalist, focusing on the "dark side of Facebook" [Pearse, 2012]. I found that some parents strongly disliked FormSpring, Google Buzz, Skype, and other social software for exactly this reason–if they heard about problematic uses of these sites, they immediately worried about their own children's uses. Presenting a balanced perspective of technology and its social impacts on family life is an area that researchers and policymakers need to continue to address.

Parenting is not democratic and there may be little end-user control built into digital systems from the perspective of the child. Technical arrangements and social order work on built-in assumptions about parent-child relations and power imbalances. This resurfaces familiar questions about child rights; in particular, do children have a right to privacy? What are the tradeoffs between control and autonomy? Circumvention and freedom? Supervision and surveillance? Do teens' values differ from parents and to what extent does technology fall under their own personal domain? Should empathy and compassion be a component of technoparenting?

My research has shown that parents struggled with questions about whether or not to monitor their children and how much to do so. Monitoring children is a contentious topic, and suggests helicopter parenting, overparenting, and other kinds of anxious parenting [Stearns, 2004]. Indeed, the parent who secretly knew her child's Gmail password said, "you probably don't agree with this." Monitoring and spying are a lingua franca when talking about parenting and technology [Stearns, 2004,

Nelson, 2010, Turkle, 2011], similar to language used among government and policy-makers with respect to privacy. This seems problematic. Parents need a language and framework to think about their children's technology use that doesn't immediately position them as either negligent or hyperparent (see parenting styles in [Baumrind, 1966]). Instead, new theoretical frameworks are needed to talk about how parents can keep up with their children's technology use while supporting children's growing autonomy and independence.

Across all families, however, childhood begins with dependence on parents and ends with independence from them. Yet, the rate of progression from dependence to independence varies by child. Parents may not be comfortable with their child's progression, especially as changes happen at increasingly young ages. Lack of control can make the process of enforcing parenting philosophies more difficult. Some parents want to wield more control over their children but don't know how; others know how but find it to be a constant battle to enforce rules and keep up with changes in technology. Still others are unsure what the right balance is between control and independence, and privacy and safety. All parents want their children to be happy and healthy and developmentally progressing. The challenges I heard from parents over and over again indicate a need for designers to consider new systems and policies to support parents. For a long time my research has been motivated by the belief that people–including children–should have agency and ownership in their use of technology. Yet my results here and others' suggest more nuance is needed. In the same way that parents dictate children's sleeping, eating, and playing patterns, there is a need for deep guidance of technology use. For children, we want to support parents' desire to monitor and manage their children's social media use. For teens, we want to support authoritative parenting practices [Baumrind, 1966] while respecting teens' growing personal domains.

More generally, there are growing concerns about multi-tasking, addiction, lack of

physical movement, poor relational development, and underdeveloped communication skills in people's technology use [Ophir *et al.*, 2009, Carr, 2010, **?**, Sisson *et al.*, 2009]. These contribute to a generally shared sentiment that some amount of respite from technology is desired and needed [Woodruff *et al.*, 2007]. Adult use of social media has also increased rapidly. It is reasonable for parents who use a smart phone at the dinner table to expect that their child will mimic this behavior. These issues will have to be addressed as technology continues to pervade and invade people's home routines. Other work has suggested that mechanisms to force desirable behavior and respite from technology-such as observing the Sabbath-can be beneficial [Woodruff *et al.*, 2007]. The question that could arise is why bother with technology? Why not block technology until children are 18? Numerous studies support the ways that technology can help children learn, play together, build creative skills, and socialize [Papert, 1980, Bruckman, 1999, Benford *et al.*, 2000].

We as a society know little about what the right balance is for children and technology use. Do children have a right to privacy? What are the tradeoffs between control and autonomy? Do teens' values differ from parents and to what extent does technology fall under their own personal domain? It is also difficult for parents to explain why rules are set the way they are when parents themselves may not know. Thus, the ideas put forth here are socio-technical. Technology alone will not make poor parents become good parents. Parents and children need to learn to make informed choices. The overarching goal is to support and teach parents and children to become stewards of their own technology use.

Setting boundaries around technology use can be an important mechanism for learning, self-control, and reflection; however, understanding the impact of technology requires a vision where people are in control of the devices and services they use rather than the technology being in control of them. I have demonstrated here the

challenges maintaining such a vision when fears about overuse and misuse are pervasive, especially among a vulnerable population like youth and a concerned population like their parents. The social life of technology at home takes on new meanings as devices become more ubiquitous across life stages, from baby to elder. Future research agendas should consider both the social implications of technology as they related to privacy, monitoring, disconnecting, and connecting, as well as design implications for supporting extended family connectedness and boundary setting.

APPENDIX A

PARENT INTERVIEW PROTOCOL

Thanks for taking the time to chat with me today! I'm interesting in learning about the ways that you and your family use computers and technology. I'm not looking for any particular answers-I'm interested in hearing your stories!

1. Tell me a little bit about yourself and your family. What do you and your kid(s) like to do? (hobbies, activities)
2. What kinds of technology and media do your family use at home?
   (a) Where is(are) the computer(s) located in your house?
   (b) What do other family members do with the computers and technology at your home?
3. Does your child/children talk to you about what they do when they're online?
   (a) What kinds of things do they tell you about?
   (b) What kinds of things don't they tell you about?
   (c) Do they tell you about what they put or write online (eg blogs, pics, comments)?
4. Do you give your children advice about what they should or should not do online?
5. How often do your children text message? Spend time online? watch TV?
6. If you could know anything about what your children do online, what would you want to know?

7. Do you think parents should monitor or keep an eye on what their children do online? What is your own approach to this?

8. Do you talk to other parents about your children's Internet use? Who do you chat with? What do you talk about?

9. Do you think your child's use of the Internet is similar to that of other childrens'? In what ways is it similar? In what ways is it different?

10. Do you have a Facebook account? Why did you join? Have you discussed Facebook with your child?

11. Would you like to have more or less control over your child's use of the Internet?

12. Anything else you would like to tell us?

APPENDIX B

PARENT FOCUS GROUP

Thank you all for taking the time to chat with me today! This will be a group format. I'd like to hear from all of you. I'm interested in learning about how families use technology in their lives. Confidentiality cannot be guaranteed within a focus group setting. However, please do your best to keep the conversation within this group out of respect for the other parents here.

1. What kinds of technology do your families have at home? Where is it kept? Who uses it?

2. What strategies do you use to manage your families' use of technology?

3. Are there rules at home about technology use? [time of day, location of use, how it can be used]

   (a) How are these rules enforced? Who in your family enforces the rules?

   (b) Do you monitor your children's Internet and cell phone use?

4. Who in your families would you say knows the most about technology? Who knows 2nd most? Etc. [If you couldn't get on the Internet, who would you go to for help first?]

   (a) Why do you think [X] knows more about technology?

5. Do you share technology? Who do you share it with? How do you decide who gets to use it and when?

6. How do you keep up with changes in technology? [How do you learn new things? Who do you learn from?]

7. How do your families use technology? How do you keep in touch within your immediate family? How about members of the extended family?

8. Do your children talk to you about what they do when they're online?

   (a) What kinds of things do they tell you about?

   (b) What kinds of things don't they tell you about?

   (c) Do you think parents should monitor or keep an eye on what their children do online? What are your own approaches to this?

   (d) Do you have Facebook accounts? Are you friends with your children on Facebook?

   (e) What do you think are the benefits of technology in your families' lives? [What opportunities do they offer in your families' lives?]

   (f) Walk me through a day in the life of your family. From the time everyone wakes up to the time when everyone goes to sleep, when and how is technology used? [Who do your kids communicate with? Which devices are used when? What are they used for?]

   (g) Do you think people should spend more or less time with technology? What about your own use and your children's' use?

   (h) What do you think are the downsides of technology?

   (i) What kinds of things do you think [school] can or should do to help your children manage their social media use?

   (j) What kinds of things do you think [school] can or should do to support you in managing your families' social media use?

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