Parenting Across the Social Ecology Facilitated by Information and Communications Technology: Implications for Research and Educational Design

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To inform parenting research and aid educators seeking to deliver programs that support effective parenting, this study explored types of information and communications technology (ICT) used to fulfill childrearing goals. Mothers' (N = 1,804) reports of ICT activity frequency were examined from data collected from an online survey. Results suggest that mothers' ICT use for parenting is less frequent than general use in adulthood. Mothers employ ICT to fulfill parenting goals within and across five domains of the parenting social ecology: (a) parent development, (b) parent-child relationships, (c) child development, (d), family development, and (e) culture and community. Several types of ICT activities may strengthen parenting in a single domain, and a single ICT activity may help fulfill multiple domains. Implications for research and for promoting and selecting ICT for effective parent learning and education design are discussed.

Keywords: Parenting, information and communications technology (ICT), education design, parent learning, parent development, social context, technology integrated instruction

Introduction

The exponential growth in use of information and communications technology (ICT) in the last two decades has changed family life in the United States. ICT is a general term referring to electronic, often Internet-capable devices, such as laptop or tablet computers, cell phones and smartphones, and the software and applications used on these devices. Cell phones, for example, allow for faster and more convenient communication between co-parents and between parents and children. Online search tools offer quick access to information for problem solving. As research on parents' technology use evolves with changes in the availability of ICT (Wartella, Rideout, Lauriella, & Connell, 2013), scholars are beginning to understand how the use of new technology relates to relational and developmental processes in individual and family life (Drentea & Moren-Cross, 2005; Hall & Irvine, 2008). ICT also offer tools for Extension and other outreach educators and family professionals to engage learners in effective and interesting

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ways that blend content-driven, relational, and social dynamics of learning and accommodate individual learning needs (Barron, 2004; Bransford, Brown, & Cocking, 1999; Ebata & Dennis, 2011; Snyder, 2009). Therefore, family professionals jointly benefit from understanding how the use of ICT relates to parenting outcomes, and how these devices and activities can serve as tools for learning.

The study that follows investigates and organizes parents' technology use in a framework (the Parent Education Core Curriculum Framework; ECFE Curriculum Committee, 2011) that categorizes parenting tasks in domains representing a social ecology: developmental and learning processes specific to the parent, relational processes between parent and child, and interactions in the family and community context that support childrearing. To date, research has begun to better understand parent ICT use and unpack some of the knowledge gathering and social support processes that contribute to parent learning and parenting behaviors (Madge & O'Connor, 2004; Rothbaum, Martland, & Jannsen, 2009), and as a result, recommendations have surfaced. Yet to our knowledge, no study has attempted to investigate parents' ICT use as facilitating a range of parenting functions and outcomes within the same population group, or to identify these functions within an ecological perspective of parents' social relationships and contexts. Nor has any study yet matched the ICT used by parents to their information, communication, or creative potential for aiding parent learning. Technology-integrated educational design in family life best reflects learner needs and practices while facilitating a process that encourages learning and growth (Hughes, Bowers, Mitchell, Curtis, & Ebata, 2012). Therefore, the current research purposefully organizes ICT activity by adults' reasons for use for parenting within distinct and interrelated personal and social ecological domains, and then examines the technology device and application properties related to knowledge acquisition, communication, and creativity.

To set the stage for this research, we first present a conceptual framework of the ecology of parenting that explicates childrearing as a social, cognitive and developmental phenomenon. We then review empirical literature on parents' ICT use, parent learning and behavior, and the role of instructional design in effective technology-driven supports for parenting.

The Social Ecology of Parenting

Most social systems perspectives of parenting emanate from a bio-ecological paradigm (Bronfenbrenner, 1995). This perspective recognizes individual behavior and growth as influenced by interacting systems, sensitive to change and time, in which the individual is variably affected; growth is largely related to qualities unique to the individual and to proximal processes and interactions. Within this paradigm, Belsky's (1984) analysis of research identified childrearing behavior as the product of interactive influences and compound relationships and processes between the parent, the child, and the social context. This perspective identifies parent

personality, maturation, experience with the child and with childrearing and wellbeing as inherent and acquired factors that influence parenting behavior.

Interaction with the social context provides the parent with norms, values, and supports that can shape and reinforce practice. These include supports that help adults acquire a greater repertoire of cognitive, behavioral, and relational skills and reinforce identification with the parenting role. For example, interactions with more experienced parents scaffold learning and develop parent knowledge and identity toward deeper and more complex levels (Azar, 2003; Marienau & Segal, 2006). Influences on the parent, the child, and parent-child relationship can include those at more immediate levels (e.g., co-parenting and couple relations) or those more distant, such as those in the geographic neighborhood, communities of support and practice, and broader influences from the culture and society (see Luster & Ogakaki, 2005, for a review). Taken together, these social and ecological perspectives of parenting embrace development of the parent and of the child in a reciprocal bond of trust and attachment in the parent-child relationship and identify the proximal and distal social and relational contexts of the family and larger society as influences on the parent's knowledge, skills, abilities, and attitudes. Aims to influence parenting knowledge and behavior, therefore, must view these interacting social ecological forces at work systemically.

One attempt to articulate effective parenting that reflects the social ecology is the Parent Education Core Curriculum Framework (PECCF; ECFE Curriculum Committee, 2011), a tool used for educational planning. The PECCF identifies domains with goals for positive parenting that represent a range of child-rearing contexts and cognitive, attitudinal, or behavioral processes for successful outcomes for parenting, child development, and family life. Domains include: (a) parent development, which includes influences that affect parent maturity, identity formation, and confidence; (b) parent-child relationships, which promote nurturing and maintaining a positive relationship with the child; (c) child development, including the promotion of understanding of physical, social, emotional, and cognitive development, as well as tailoring parenting to match the child as an individual; (d) family development, which involves promoting positive relational and practical dynamics that affect family functioning; and (e) culture and community, which is comprised of the wider context considerations from the neighborhood and society. The current study uses this framework to explore parent technology use as a social ecological phenomenon.

Information and Communications Technology and Parent Learning

Family professionals have interest in understanding not only family processes and practices, but also the ways in which tools families use for knowledge gathering and communication may be employed in the design of programming. Existing research confirms that ICT that includes social, mobile media that offer navigable content, online discussion, and collaborative tools

provide parents with easy access to information resources, and connection to supportive communities where knowledge can be exchanged, confirmed, and constructed (Dworkin, Connell, & Doty, 2013). Technology integration in instructional design for family life education must regard user preferences and learning needs to ensure successful participant recruitment and engagement. This means understanding the parent as an adult learner and tailoring content and delivery to address self-directed, independent, and practical interests and to enable the learner to build on their personal experience (Snyder, 2009; Walker, 2010). It also means understanding the reasons parents as technology users variably employ technology in daily life to facilitate parenting tasks and promote their learning, and to appropriately select and facilitate effective use of ICT for program and resource delivery (Ebata & Dennis, 2011).

Like adults in general, parents vary widely in their technology use. Some are active users while others are more reserved or selective in use due to limited access or less positive attitudes toward technology (Walker, Dworkin, & Connell, 2011; Wartella et al., 2013). Research shows that the Internet is an important source of child rearing and general health information for parents (Cain, 2008; Na & Chia, 2008; Radey & Randolph, 2009). Parents also use ICT specifically to maintain offline relationships through a variety of devices and activities (e.g., communicating with extended family through email, webcams, and social networking; Tee, Brush, & Inkpen, 2009). Parents report valuing online connections with other parents to develop community connections, exchange social support, share information, and deepen understanding of the parenting experience (Hall & Irvine, 2009; Madge & O'Connor, 2004). Parents also use ICT to supplement their offline worlds when information or entertainment resources are not available in their community (e.g., mothers who find support for parenting a special needs child through an online forum when similar help is not present in their community; Scharer, 2005). As an open, accessible, and shared space, the Internet also facilitates the creation of social networks (Bartholomew, Schoppe-Sullivan, Glassman, Kamp-Dush, & Sullivan, 2012).

Research also suggests processes in ICT use relate to parent well-being, learning, and parenting outcomes. New parents' Facebook activity may be related to satisfaction with the parenting role based on interaction with certain individuals (family), and with parenting stress based on activity frequency and comments on pictures (Bartholomew et al., 2012). Hall and Irvine's (2008) analysis of Canadian mothers' use of an online platform for communication revealed that emotional and social exchanges enabled mothers to share strategies, confirm beliefs, anticipate childrearing difficulties, and normalize child development and their own experiences; all elements that explicate socio-cognitive processes that affect change.

Educational programs may come to affect one (e.g., knowledge, emotional well-being) or a range of parent outcomes. Ebata and Dennis (2011) suggest that employing ICT enables education professionals to tailor material and delivery to meet parents' needs, to structure content in creative ways, and to create opportunities for interaction, including chat rooms, forums, and

blogs. Online classes for parents employ a range of learning and engagement features (Hughes et al., 2012), show similar effectiveness as face-to-face classes, and parents report preference for online delivery methods (see Nieuwboer, Fukkink, & Hermanns, 2013, for a review).

Based on the review of the literature and observed needs in the field, the goals for this study were threefold. Our first goal was to examine adults' use of ICT specifically for parenting relative to reports of general use. Our second goal was to situate parents' goals for technology use for parenting in a framework of discrete and interacting domains of parenting that represent aims related to parent competence, understanding of child development, and interaction with the family and community. Lastly, by exploring the apparent trends in the types of ICT activities that align with parenting domains, we identify cognitive, social, and creative tools for parent learning that may be employed in instructional design.

Method

The data for this study are from a larger online survey research project (the Parenting 2.0 project at the University of Minnesota; see Connell, 2012 for project summary report) designed to better understand parents' general technology use and technology use specifically for parenting. Participants were recruited through listservs of professionals who have direct contact with parents, social media posts (e.g., Facebook), and face-to-face efforts (details about procedures in study report; Connell, 2012). Parents who responded to the online survey ($N = 2,240$) between May 2010 and December 2010 were mostly mothers (88.0%), White (83.3%), and married or living with their partner (83.8%). The respondent sample is similar to those gathered through other online surveys of parents' Internet use (Dworkin, Connell, & Doty, 2013). Without targeting specific parents, the larger study represents those with a wide range of children by age (mean age of children = 11.36 years, $SD = 7.96$, range = 0-52; a child age of 0 indicates the child was less than one year old), and who represent diverse geographic areas (18.3% urban, 51.8% suburban, 28.3% rural) in the United States.

Given the lack of representativeness by the number of fathers in the larger sample, the current study's sample was limited to mothers. To focus the research on childrearing during active parenting years (Galinsky, 1987), the age of 26 was selected as the cut-off for oldest child (as determined for health insurance coverage of dependents in the U.S.). Limiting the sample yielded a total of 1,804 participants (80.54% of the larger sample). Demographic analysis of the selected sample revealed that, like the full sample, mothers were predominantly White (83.6%), with higher incomes (59.4% reported family incomes greater than $50,000/year) and higher levels of educational attainment (74.6% reported possessing a college degree or higher). Mothers' age ranged from 19 to 69 years ($M = 40.8$; $SD = 9.19$). Within the sample, 29.2% had an oldest child between the ages of 0 and 5 years, 24.9% between the ages of 6 and 12, 17.3% between the ages of 13 and 18, and 28.6% had an oldest child between the ages of 19 and 26.

Measures

ICT activity. Participants were asked how often they do 11 ICT activities (see list in Table 1) in general (Allen & Rainie, 2002) using a six-point Likert-type scale (1 = *Never,* 6 = *Several times a day).* The activities represent a range of common activities individuals perform with computers, cell phones, gaming systems, and other Internet-capable devices common to most surveys of device use (e.g., Wartella et al., 2013). They also represent device considerations of instructional design promoted by developers of Family Life Education (Ebata & Dennis, 2011; Hughes et al., 2012). The ICT types include: information-centric activities (search for information, read emailed newsletters), communication activities (email, text, voice-over IP, e.g., Skype), connectivity activities [online social networking (SNS, e.g., Facebook), discussion boards, read/comment on blogs], and creative activities (share photos, create or maintain a website). Participating in an online class was included for analysis because it represents an increasingly popular method of nonformal education for parents (Hughes et al., 2012) and may incorporate a range of ICT types, such as discussion boards and emailed newsletters. Participants received a follow-up question asking how often they do each activity specifically for parenting. Those who responded *Never* for any activity in general did not receive the follow-up item. Participants received a definition of parenting prior to answering the follow-up question.

Parenting functions. Parents who reported doing an ICT activity for parenting weekly or more received a follow-up checklist question asking them to indicate how the activity helps them as a parent (see Table 2 for parenting functions). Each of the parenting function variables was dichotomous with two levels (*yes* and *no*). For example, a parent who reported using email for parenting weekly or more received the follow-up question: "You said you send and receive email for parenting. Can you tell us more about how this helps you as a parent? Check all that apply." Function response options varied in number and content by ICT activity, based on appropriateness of fit between function and activity (for example, the parenting function "express myself or be creative" was not among the list for the "look for information" ICT activity).

Data Analysis Plan

Frequencies were computed to determine levels of ICT activity in general and ICT activity specifically for parenting (see Table 1). To examine adults' use of ICT specifically for parenting relative to reports of general use, Cochrane's Q tests were computed (Seeger & Gabrielsson, 1968). This analysis tests for differences in proportions between two related samples (i.e., the same parent responded to frequency of an ICT activity in general and frequency of an ICT activity for parenting) and was used to compare the proportion of parents who do each ICT activity in general once a day or more and the proportion of parents who do each ICT activity for parenting once a day or more.

To situate parents' use of ICT into an ecological framework and tie ICT activities to parenting domains, all possible functions were coded to align with the childrearing goals in the Parent Education Core Curriculum Framework (PECCF; ECFE Curriculum Committee, 2011) described above. To validate matching parenting functions to PECCF domain goals, two coders independently coded all possible functions offered for the ICT activities, seeking alignment with goals within that domain (Lincoln & Guba, 1985). For example, the parent-child relationships domain includes the goal "interact with their children in a mutually engaging way, characterized by turn-taking in play and conversation." A parenting function offered on the survey coded to align with this parent-child relationship domain goal was, "communicate with my child." The initial inter-rater reliability was 90%. Coders then met to discuss disparate coding decisions, ultimately reaching complete agreement on each function and domain affiliation.

To identify the most salient patterns of behavior, ICT use for specific parenting tasks was examined for reports by at least 25% of parents who use the technology activity for parenting weekly or more often. As an example, as shown in Table 2, 68.4% of all mothers in the study reported using ICT for information seeking weekly or more often. Of these mothers, one third (33.7%) reported that information seeking helps them resolve conflicting parenting information. As coded, this task identifies the information-centric activity, information seeking as helping to satisfy the parent development domain.

Results

Mothers' General ICT Activities vs. ICT Activities for Parenting

Comparing the proportions of mothers reporting doing the ICT activity once a day or more frequently in general to the proportion reporting doing the activity once a day or more frequently for parenting revealed that in all cases, frequency of doing the ICT activity in general was significantly more than the ICT activity for parenting (see Table 1). In most cases, the proportion of mothers reporting daily ICT activities for parenting was about half of the proportion of mothers reporting daily general ICT use. Activities central to information seeking, as well as activities focused on communication, were engaged in most frequently, both for general use and for parenting. For example, almost all mothers reported emailing once a day or more, and over half reported emailing once a day or more specifically for parenting. Looking for information, texting, and social networking were reported by more than half of the mothers as done at least once a day in general, and by 25% or more as done at least once a day for parenting. Maintaining websites and taking online classes, both for general use and for parenting, were infrequent activities on average. Ten percent or fewer reported these activities at least daily for general use or weekly or more for parenting.

Table 1. ICT Activity Frequencies Comparing General Use to Use for Parenting (N = 1,804)

ICT Activity		Never	Monthly or less[b]	Weekly	Once a day or more[c]	Cochrane's Q[d]
Information-centric Activities						
Look for information	n (%) general[a]	4 (0.2)	182 (10.1)	660 (36.6)	954 (53.1)	281.74
	n (%) parenting	38 (2.1)	507 (28.5)	790 (44.4)	445 (25.0)	
Read emailed newsletters		81 (4.5)	323 (18.0)	634 (35.4)	750 (42.1)	249.94
		175 (10.2)	530 (30.7)	642 (37.2)	380 (21.9)	
Communication Activities						
Text message		366 (20.5)	165 (9.2)	186 (10.4)	1074 (59.9)	183.68
		583 (33.0)	175 (9.9)	248 (14.0)	766 (43.1)	
Email		6 (0.3)	11 (0.7)	45 (2.5)	1724 (96.5)	193.14
		62 (3.7)	163 (9.3)	442 (25.1)	1089 (61.9)	
Skype		857 (47.7)	634 (35.3)	247 (13.8)	58 (3.2)	34.83
		1168 (65.6)	387 (21.7)	183 (10.3)	44 (2.4)	
Connectivity Activities						
Social networking		275 (15.5)	169 (9.5)	235 (13.2)	1097 (61.8)	373.37
		560 (32.2)	279 (16.0)	306 (17.6)	597 (34.2)	
Discussion boards		611 (34.3)	507 (28.4)	265 (14.9)	401 (22.4)	133.97
		950 (53.9)	378 (21.4)	204 (11.6)	232 (13.1)	
Read/comment on blogs		491 (27.6)	571 (32.0)	341 (19.1)	380 (21.3)	234.57
		932 (52.8)	417 (23.6)	233 (13.2)	184 (10.4)	
Creative Activities						
Share photos		43 (2.4)	621 (34.7)	759 (42.2)	372 (20.7)	170.71
		177 (10.6)	700 (41.6)	589 (34.9)	218 (12.9)	
Create/maintain website		1215 (68.6)	300 (17.0)	142 (8.0)	113 (6.4)	169.53
		1543 (87.9)	143 (8.2)	39 (2.2)	30 (1.7)	
Nonformal Learning Activity						
Take online classes		607 (34.7)	835 (47.7)	161 (9.2)	147 (8.4)	123.83
		1179 (68.6)	424 (24.6)	62 (3.6)	54 (3.2)	

[a]Top row for each activity is frequencies for general use, bottom row for each activity is frequencies for use for parenting.

[b]Combined responses to "less than monthly" and "monthly."

[c]Combined responses to "daily" and "several times a day."

[d]All Cochrane's Q values are significant, $p < .001$.

ICT Activities to Fulfill Parenting Functions

As shown in Table 2, in general, activities for information gathering are those reported by parents to fulfill their interests for seeking information, resolving a problem, exploring new and confirming existing ideas; activities for communication are used to communicate with the child, nonresident family members and friends, and spend time and have fun with family. Connectivity activities, such as using SNS, participating in discussion boards, and reading blogs, fulfilled a range of tasks, including gaining support, building a network, exploring new ideas, and offering advice, as well as communicating with family and friends. Creative activities offer opportunities for self-expression and communication. Nearly half of the mothers reported sharing photos weekly or more often, and of that group, fully 91% report doing this to communicate with nonresident family. Although used frequently by a very small portion of mothers, online classes are ways that parents seek information and connect with professionals.

Parenting Domains Fulfilled by ICT Use

Looking at activity use for parenting tasks in Table 2 reveals that each parenting domain from the PECCF had at least one function identified by a high proportion of the mothers (more than 50%) who reported doing an ICT activity for parenting at least weekly. These included exploring new ideas and advising others (parent development) by those using discussion boards; communicating with child (parent-child relationship) by those using Skype; seeking information, identifying problems, and normalizing the child's behavior (child development) by those searching for information or using discussion boards; communicating with nonresident family (family development) by those texting, sending email, using Skype and social networking sites, and sharing photos; and communicate with friends (community and culture) by texting, sending email, and using SNS.

The proportion of mothers who reported that a specific function was facilitated by a specific ICT activity varied within each domain. In the parent development domain, connectivity tasks – using discussion boards and reading blogs – were noted by greater than half to explore new ideas. In fact, although only reported by a quarter of the mothers for frequent use, nearly one-third or more of those who do identify using discussion boards, fulfill all five tasks in the parent development domain. Many mothers also identify information-centric and creative activities and participating in online classes as ways to explore and confirm ideas, to resolve conflicting information, and for self-expression.

In the parent-child relationship domain, communication, connectivity, and creative activities were identified to fulfill the single task of communicating with her child. Between 43-58% of those who reported using Skype, email, or texting noted this as a function. Approximately one-third of those using SNS or sending pictures fulfill the parent-child relationship task.

Table 2. Mothers' Report of Parenting Function by Type of Information and Communications Activity (N = 1,804)

ICT Activity	% of Mothers Reporting Activity for Parenting Weekly or More Often	Parenting Domains Fulfilled by ICT Activity	Function of Activity	% Reporting Function of Those Who Report Activity for Parenting[a]
Information-Centric Activities				
Look for information	68.4	Parent development	Resolve conflicting information	33.7
			Explore new ideas	44.9
			Confirm ideas I already had	48.8
		Child development	Seek information, advice	81.5
			Identify a problem	73.4
			Normalize child's behavior	52.7
		Family development	Review products	69.6
Read emailed newsletters	56.7	Parent development	Explore new ideas	36.7
			Confirm ideas I already had	28.1
		Child development	Seek information, advice	58.9
			Identify a problem	36.2
			Normalize child's behavior	29.6
		Family development	Review products	35.0
		Culture & community	Connect w/professionals	40.1
Communication Activities				
Text message	56.2	Parent-child relationship	Communicate w/child	58.0
		Family development	Communicate w/nonres family	64.0
			Spend time/have fun w/family	27.5
		Culture & community	Communicate w/friends	62.1
Email	84.9	Parent development	Advise others	37.9
		Parent-child relationship	Communicate w/child	42.5
		Family development	Communicate w/nonres family	78.2
		Culture & community	Communicate w/friends	73.0
			Connect w/professionals	60.9
			Gain support	43.2
Skype	12.5	Parent-child relationship	Communicate w/child	50.2
		Family development	Communicate w/nonres family	64.3
			Spend time/have fun w/family	27.8
Connectivity Activities				
Social networking	50.1	Parent development	Express myself	37.9
		Parent-child relationship	Communicate w/my child	37.4
		Family development	Communicate w/nonres family	81.3
			Spend time/have fun w/family	32.9
		Culture & community	Communicate w/friends	84.5
			Build my network	59.5

Discussion boards	24.2	Parent development	Resolve conflicting information	31.0
			Explore new ideas	55.3
			Confirm ideas I already had	46.6
			Express myself	31.0
			Advise others	54.8
		Child development	Seek information, advice	85.3
			Identify a problem	51.1
			Normalize child's behavior	44.7
		Family development	Review products	52.1
		Culture & community	Build my network	54.8
			Gain support	71.3
Blog (comment, read)	23.1	Parent development	Explore new ideas	50.8
			Confirm ideas I already had	27.6
		Child development	Seek information, advice	60.7
			Identify a problem	28.1
		Family development	Normalize child's behavior	27.3
			Communicate w/nonres family	35.3
			Review products	37.2
		Culture & community	Communicate w/ friends	37.2
			Build my network	39.8
Creative Activities				
Share photos	44.7	Parent development	Express myself	41.4
		Parent-child relationship	Communicate w/my child	34.3
		Family development	Communicate w/nonres family	91.4
			Spend time/have fun w/ family	41.9
Create or maintain website	3.8	Parent development	Express myself	43.5
			Advise others	47.8
		Culture & community	Communicate w/friends	42.0
			Connect w/professionals	36.2
			Build my network	36.2
			Gain support	31.9
Nonformal Learning Activity				
Take online classes	6.4	Parent development	Resolve conflicting information	37.9
			Explore new ideas	31.0
			Advise others	28.4
		Child development	Seek information, advice	60.3
			Identify a problem	37.9
		Culture & community	Connect w/professionals	50.9
			Build my network	43.1
			Gain support	43.1

[a]Only functions identified by ≥ 25% of those reporting an activity for parenting weekly or more often are listed.

Within the child development domain, seeking information and advice was achieved by more than half who read emailed newsletters and blogs and took online classes. Other domain tasks of learning about development, identifying problems, and normalizing children's behavior appear to be facilitated by looking for information and through connectivity (using discussion boards), as 45% or more of mothers who reported doing these activities for parenting cited these functions.

For the most part, the family development domain was characterized in mothers' ICT use through family communication. Two-thirds or more of mothers who used communication and connectivity activities (text messaging, email, Skype, social networking, and sharing photos) reported them as ways to communicate with nonresidential family. Looking for information and interacting on discussion boards were useful for reviewing products in this domain.

Within the community and culture domain, nearly two-thirds of more frequent users identified communication (texting, email) and social networking as ways to communicate with friends. Email was also identified as useful for connecting with professionals (61%), as was taking online classes (51%). Social networking and discussion boards were helpful to over half of those who used them at least weekly to build their network. Most mothers (71%) who used discussion boards frequently identified them as useful for gaining support. Participating in online classes was also useful to building social networks and gaining support.

Discussion

As access to the Internet and use of information and communications technology expands to reach all demographic sectors, family professionals must understand the distinct role that ICT plays in parenting and how digital and online devices and activities can be used as education and outreach tools to help parents fulfill active parenting goals. By observing differences in the types of ICT activities that support parenting functions and situating parenting motives for ICT use within ecologically-oriented childrearing goal domains, this study offers an organizational framework for further research on the relationship between ICT use and parenting processes and outcomes. Elucidating ICT use for parenting within this framework also facilitates intentional selection of ICT activities in the design of parenting education and support online and offline.

Parenting as a Distinct Use of ICT

This study revealed that there are significant differences in the frequency in which mothers reported ICT activities for general use and ICT activities used specifically for parenting. Adults may use social networking sites like Facebook every day, for example, as did 61% of mothers in this sample; as parents, these platforms were accessed less frequently. Of the mothers who reported using social networking sites for parenting, slightly more than half reported using social networks daily for parenting, and half reported that they never use social networking for parenting. Given that mothers reported less frequent use of all activities, and some reported never using activities for parenting, research that does not discriminate between general use and parenting use of ICT may be overestimating or misrepresenting use. Research interpreting adult ICT activities to be parenting-specific because the sample identifies as parents presumes that actions such as reading email or going on Facebook is in the service of parenting, when in fact there may be other adult or individual motives for this ICT use. Childrearing confers distinct

legal, societal, and developmental roles and responsibilities for adults (Marienau & Segal, 2006). The questions and issues that parents seek to resolve relate to the parenting experience and life stage changes that come with parenting. This focus affects who and where parents turn to for help and support, including online sources (Hart Research Associates, 2009; Radey & Randolph, 2009). Whether examining within-group differences in use or differences between parents and nonparents (e.g., Allen & Rainie, 2002), data collection on ICT use must be specific to the motivations that serve and impact parenting interests.

ICT Use for Parenting Across Ecological Domains of Childrearing

Previous research has determined that ICT use serves parents in separate personal and relational domains in the childrearing ecology. Parents use technology to learn about child development (Na & Chia, 2008; Connell, 2012), to validate beliefs (Bernhardt & Felter, 2004), to maintain relationships with their children, and to connect with family (Devitt & Roker, 2009; Tee et al., 2009) and friends. By jointly examining multiple domains of childrearing within the same population, this study validates what other research separately suggests: that ICT activities help parents achieve a range of parenting goals.

An ecological developmental view of parenting holds that the self, child, parent-child relationship, family microsystem, and larger community and culture are intertwined. As these intersecting ecologies are in synergy, individual development, parenting behavior, and parenting outcomes are positive. The current study suggests that ICT may be used to maintain individual elements within this ecology (e.g., reading online newsletters to strengthen information gathering about child development) and the system as a whole (e.g., promoting parent development by validating beliefs through talking with others on discussion boards; answering questions about child development through information seeking; and using email and social networking to engage family, friends, and professionals as information sources and expand the size of parents' social networks). As parenting does not occur in isolation and is the product of an intersection of settings, relationships, people, and processes, the current findings suggest that research continue to examine ICT-facilitated processes that influence parenting within and across domains.

Domain Fulfillment by ICT Activity

Single domain, multiple ICT activities. This study revealed that mothers might use a variety of ICT activities to fulfill goals in a single parenting domain. Parent learning about child development, for example, may be enhanced through parent engagement in activities that are cognitive and social in nature: web pages and newsletters that are content-focused and hyperlinked to additional content; discussion boards that offer information exchange with parenting peers; and email communication to friends, family, and professionals that enables inquiry for problem-based learning. Moving beyond simple read and write functions, Web 2.0

affordances permit parents to learn through a mixture of content, social exchanges, collaboration, and the co-construction of knowledge (Ebata & Dennis, 2011). Haythornthwaite (2005) refers to the phenomenon of complementary device use as "media multiplexity" and observes that individuals who use several media are more likely to have stronger network ties.

Single ICT activity, multiple domains. Parents may also employ or participate in a single type of ICT activity to fulfill a range of parenting domains. Communication devices such as cell phones or Internet-capable devices that facilitate conversation through voice and text can strengthen relational ties to children (parent-child relationship), family members (near and extended; family development) and friends, professionals, and others (community and culture), conferring different types of social capital (Lin, 1999). They also can be used to connect with others to offer advice (parent development), gain information that normalizes the child's behavior (child development), and have fun (family development). As determined elsewhere (Brady & Guerin, 2010), this study suggests that an ICT activity like a discussion board may be, for those who use them, a popular means for exploring new ideas, advising others and seeking advice, gathering useful information about their child and for their families, and as a way to build social support. Other single interactive activities, such as using social networking platforms like Facebook, may be instrumental in aiding mothers' sense of well-being, knowledge, confidence, and connection across all dimensions of their social ecologies.

Implications for Instructional Design

This study revealed that technology that is familiar and popular with parents may be tools selected by family education professionals to engage learners, provide content in ways that are individually meaningful, and facilitate social interaction for community-centered learning. In other words, the technologies already used by parents provide media for effective learning (Bransford et al., 1999). As the value to parenting has been situated in the technological framework presented, family education professionals can match ICT activities for parenting that also satisfy the goals of intentional instructional design. In their recommendations for the design of online family education programs, Hughes and colleagues (2012) advocate starting with an analysis of the problem and selecting instructional media to achieve intended outcomes. This framework enables professionals to determine parenting goals and then identify the technology that satisfies specific learning outcomes. For example, if a goal of a particular program is to enhance parent understanding of child development, the selection of tools that facilitate interaction with others (discussion boards, etc.) may promote that learning through the exposure of new ideas, the confirmation of beliefs, and the opportunity to hear a range of perspectives. Offering age-paced newsletters and/or facilitating the search for information can also encourage parent learning as more content-oriented tools. These tools may be incorporated fully in online delivery and as supplements to face-to-face settings that hybridize offline and online learning (see Nieuwboer et al., 2013, for examples).

Limitations

We are cautious to attribute too much weight to the interpretation of function and ICT activity given certain limits in the data and the sample. This study does not characterize all ICT activity nor exhaust the possibilities of parenting tasks. Very possibly, additional ICT activities would represent the parenting domains offered here. For example, playing games online and through gaming devices are suggested to be creative and critical thinking activities that can encourage family time together (Hughes et al., 2012). Also, only one task was identified to fulfill the parent-child relationship domain. Other tasks, such as monitoring children's safety, might be fulfilled through ICT.

This sample is not representative of all mothers and excludes fathers. It is skewed toward those with more income and education, who are partnered and are White. Therefore, additional research is needed to validate findings with samples that are more ethnically, socioeconomically, and gender diverse, as these factors can affect device use and experiences (Rothbaum et al., 2008; Walker et al., 2011). Within this sample, it is possible that demographic characteristics contributed to observed reports of parenting tasks or technology use, though this was not the focus of the analysis. Mothers and their children in this sample did range in age. Based on age-specific research, stratification may reveal higher or lower frequencies identifying certain functions for ICT activities (Hart Research Associates, 2009; Rudi, Dworkin, Walker, & Doty, in press), which would reveal itself in attributions of activity and function frequencies. For example, we noted that parents identify communication with children through text, Skype, and email. Possibly, this range of devices reflects families in the sample with older children; parents with children under five may not report these devices for communication with the same frequency.

Conclusions

Though the results are cursory, this study suggests the wide array of parenting processes facilitated by everyday use of information and communication technologies. Family researchers are encouraged to further investigate new technologies' influence on parenting through impacts on the parent's development, interactions with children, maintaining and strengthening family connections, and membership with the wider community and culture. They are encouraged to research these domains as affected by technology singly and interactively, and to explore how even one technology activity, like participating in a discussion forum or engaging in Facebook, might have multiple influences on parenting. Family educators may be motivated to consider integrating a wider range of media to address a wider range of learning outcomes and methods. Just as our in-person instruction is aimed far beyond increasing awareness and knowledge, so too can our technological considerations capitalize on the social, cognitive, and creative capacities that facilitate learning and promote positive parenting.

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