

Young Children Learning with New Literacies

by

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B.Ed., University of British Columbia, 1994

M.A., University of British Columbia, 1998

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## Abstract

### Supervisory Committee

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Current sociocultural educational research is reconceptualising literacy and learning. For example, New Literacy theorists (e.g., Kress, 2003; Lankshear & Knobel, 2003; Leander, 2007; Jewitt, 2008) propose that literacy is no longer just about mastering traditional forms of reading and writing, but it also involves acquiring communicative functionality using multiple modes and across increasingly diverse and rapidly changing cultural and linguistic contexts. Street (2001) and the New London Group (1996) calls for research that qualitatively identifies and investigates the significance of this cultural and linguistic diversity, and the development of instructional models and practices that will help educators shape curriculum to be more relevant to students' current and future lived worlds.

Grounded in sociocultural learning theory, this ethnographic study responds to Street's call by investigating the patterns and principles of learning and teaching demonstrated by 5-year-old children while using new Information Communication Technologies (ICTs) in their homes. Questions posed are: (a) what home teaching/learning contexts exist for 5-year-olds learning to use new ICTs? (b) who is

teaching 5-year-olds how to use new home-based ICTs?; and (c) what learning and/or teaching principles do subjects demonstrate in the interactions between family members, friends and 5-year-old learners as they directly or indirectly teach the 5-year old to use new ICTs in the home setting??

Data revealed that 5-year-olds accessed an average of 14 different types of new ICTs in their homes; and they learned to use new ICTs from parents, siblings, peers, and, to a degree, from the new ICTs themselves. Additionally, the analysis of data found that participants' social interactions could be qualitatively described as aligning with 16 (at least) unique teaching and learning principles.

These principles were grouped into four general categories, and discussed in relation to the literature reviewed. It was found that participants learned to use new ICTs through: (a) *just-in-time* mentoring which corroborated learning theory by Lave and Wenger (1991) and Vygotsky (1978); (b) student centered instruction that was unstructured, playful, and encouraged participants' independence; (c) multiple communication modes (Kress, 2003); and (d) instruction that developed children's ability to be flexible and adapt to change.

Teaching and learning models reflective of the observed interactions were developed, and a socially distributed model of teaching and learning for young children was presented. Implications for educators, curriculum designers, parents, and theory were discussed.

It is suggested that teachers, administrators and curriculum designers incorporate as many of the participants' 16 teaching and learning principles as possible into their primary classroom curriculum. It was also argued that Vygotskian learning theory be re/conceptualized to incorporate a more pluralistic exploration and explanation

of the relationship between thought and the multiple meaning making modes exhibited by the 5-year-olds in this study.

Moreover, it was suggested that the incorporation of these principles not be done in a manner that co-opted young children's out-of-school ICT-mediated discourse practices, but instead encouraged young children to develop skills, information and understandings that could be distributed and applied across larger sets of networked discourses.

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Dziękuję!

Dedication

To Janet.

Companion,  
Illustrator,  
and,  
Unconditional,  
Genuine,  
Friend.

## Chapter 1: Introduction

Lifting a brush, a burin, a pen, or a stylus  
is like releasing a bite  
or lifting a claw. (Snyder, 1990, p. 66)

### **1.0 Context of Research Problem**

Five years ago the lead researcher of this study was driving his two children home from school when his 6-year-old daughter asked, “Dad, may I have a MSN account”? Instantly the researcher thought of chat room predators and became defensive. Looking in his car’s rear-view mirror, he replied, “Why would you need an MSN account when you already have a Yahoo email account”? With an exasperated cluck of her tongue she responded, “Oh dad, you can’t *hear* or *see* your friends with email. Anyways, email is for old people”. The researcher drove the rest of the way home quietly reflecting on her claim that email was for old people.

This personal anecdote highlights two of the many differences in the paths to literacy that the researcher and his daughter have followed, and are still following. The first difference is that many of the information communication technologies (ICTs) she regularly uses today did not exist 15 years ago (little less 45 years ago when the researcher was 5-years-old). The researcher’s experiences learning his grade two ICTs largely involved speech, writing with pen and pencil, reading printed text, watching television, and using land-line telephones. On the other hand, the researcher’s now 12-year-old daughter uses these same traditional ICTs, *as well as* new ones like email, cell phones, Nintendo Dual Screen (DS) game player, Internet video conferencing (yes the researcher and his daughter both have Skype chat accounts now), networked computers, and a multitude of offline and online computer programs and social

networking sites such as Kid Pix, Webkinz, Microsoft PowerPoint, YouTube, and Facebook.

Furthermore, the number of ICTs the researcher's daughter regularly uses to express herself and keep in touch with family and friends is representative of the majority of school-aged child living in a developed country like Canada. Take the daughter's use of instant messaging (IM), for example. According to research published by the *Canadian Internet Project* (Zamaria & Fletcher, 2007), 90% of the four hundred randomly surveyed Canadian 12- to 17-year-olds had used an IM, 77% used IM weekly, and 44% used it daily or more. Similarly, the *Pew Internet and American Life Project* randomly surveyed 935 U.S. 12 to 17-year-olds (and their parents) and found that 68% of the teens had used IMs, and 28% used them on a daily basis (Lenhart, Madden, Macgill & Smith, 2007).

Moreover, IMs are just the tip of the "ICT iceberg". For example, *the Pew Internet and American Life Project* (Raine, 2009) presented a meta analysis of three reports that surveyed over two thousand randomly selected 12- to 17-year-olds across the U.S. and found that 60% had their own desktop and/or laptop, and,

1. 97% played computer games and 87% used email.
2. 75% had their own cell phone and 20% had their own blackberry.
3. 60% owned a digital camera, 50% posted photos online.
4. 93% used the Internet and 90% used their browser for cloud computing.
5. 75% created content for the Internet and 55% used Wikipedia.
6. 74% possessed a MP3 player and 40% had their own video camera, and
7. 70% had used social networking sites.

Correspondingly, the *Canadian Internet Project* (Zamaria & Fletcher, 2007) surveyed four hundred randomly selected 12- to 17-year-old Canadians and discovered that:

1. 96% used the Internet and 74% felt comfortable using new technologies.
2. 81% had broadband access and used the Internet for 12 hours per week.
3. 79% played online games alone and 62% played collaboratively.
4. 80% multi-tasked when using the computer.
5. 35% had used wireless devices to access the Internet.
6. 55% used Facebook and 48% used Wikipedia.
7. 90% downloaded music and 77% listened to streamed music.
8. 58% downloaded photographs and 48% posted photographs.
9. 34% had a personal website, and 63% surfed the Internet for music concerts, and
10. 71% had access to a cell phone.

For the researcher's daughter and her peers, becoming literate today means embracing a far greater number of ICTs than any other preceding generation.

The second difference between the researcher's and his daughter's paths to literacy is that she is more comfortable than he is with using, and learning to use, a wider variety of new and rapidly changing communication modalities and technologies. For instance, both have learned (and are still learning) to create and retrieve meaning from many similar semiotic systems common to our social and cultural experiences. They both use informal speech, interpret gestures, and read and write printed text. However, a critical difference is that the researcher's early home and school literacy education mainly emphasized learning the semiotics of reading and writing printed page-bound text and visuals in an effort to access meaning from printed paper books, whereas his daughter has been, and is still, learning the semiotics of reading and writing

printed page-bound text and visuals *as well as* the semiotics of hypertext, animated graphics, audio, and other new, multiple, and rapidly combining and changing semiotic systems employed by and often unique to new digital screen-based ICTs (Kress, 2003).

These differences would explain why the researcher recommended five years ago that his daughter be content using email to communicate with her friends. Email is largely a print-based semiotic system and the researcher was comfortable using it to making meaning and communicate. The researcher's daughter, however, is still in the early stages of her life-long literacy quest and is able to access and choose from a much wider range of communication semiotic systems available through multiple new ICTs located in the public library, school, her friends' homes, and at her own home. She currently chooses to use Skype IM software because this technology permits her to access, select and simultaneously communicate using a much broader set of communication semiotic systems (reading, writing, listening, speaking, gesturing, voice inflections, emoticons, photos, and video – to name a few) than those accessible through the ICTs the researcher learned to use as a child.

### **1.1 Rationale**

The profound and multiple changes in new ICTs and literacy practices similar to the ones illustrated in this anecdote and the preceding lists of youths' new Internet communication practices have caught the attention of educators and literacy theorists over the past 15 years. In 1996, the New London Group (1996) theorized that globalization and the increased number and types of literacy technologies were converging and bringing about a post typographic literacy era that challenged and destabilized the prevailing notion that literacy meant just learning an objective and stable set of print bound reading and writing skills. Their theory focused on the ever changing social, political, and cultural dimensions of human communication, and

included all possible human semiotic systems and meaning making practices (multimodalities) in their definition of literacy. Thus music, drama, paintings, gestures, printed text, and Internet pages that employ graphics, video, sound, text, and photos are all considered *new literacies* in an ever expanding set of *multiliteracies*.

Furthermore, they hypothesized that due to both the rapid development and designing of multimodal ICTs, and the manners in which very different economic and sociocultural forces were being thrust together on a global scale, becoming literate in the new millennium would require a much more critical approach to selecting, using and producing forms of communication, as well as a tolerance for, and aptitude to engage with rapidly re/envisioned, re/created, re/combined and re/hybridized literacy practices. They also called on educators to be leaders and “designers of our social futures” (p. 89), and usher in transformative teaching/learning pedagogies that would help students and society become more comfortable and critically reflective in their use of these new ICTs and literacy practices.

Unfortunately, as Leu, Mallette, Karchmer and Kara-Soteriou (2006) reported, the vast majority of literacy educators are still mandated to follow curriculum and assessment policies that overemphasize the development of foundational print language skills, leaving little or no time for the development of these new literacies. Anstey and Bull (2006), Arbelaiz and Gorospe (2009), Eisner (1997, 2004), Marsh, (2007), and Papert (1998) further suggested that until teaching pedagogy undergoes tremendous reform, instructional practices will remain grounded in traditional reading-writing literacy models that exclude children’s multiple literacies from the classroom.

Warschauer (2007) suggested that instead of providing opportunities to develop linguistic equality in the classroom, schools actually exacerbated the literacy gap for socio-economically marginalized students by devaluing their out-of-school literacies.

Additionally, Gee (2003) argued that by devaluing students' out-of-school literacies, educators created learning environments that students continually felt were boring, irrelevant, out-of-touch of the students' realities, and demonstrated that teachers were unable to prepare students for the workplace. Heckman (2006) and Luke (2003) warned that, left unchecked, these literacy gaps would continue to widen the socioeconomic gap between the rich and poor and essentially become key barriers to a developed country's social and economic success.

When the speed at which children are embracing these new ICTs and literacy practices are juxtaposed against these warnings, there is cause for concern. For educators, this concern is heightened when one reflects upon how some of these ICTs, like the Internet, can be manipulated by media specialists to profoundly shape young children's consumer habits and literacy practices in previously unimaginable ways (Calvert, 2008; Mehta, 2008). Moreover, according to Leu et al. (2006), if literacy educators continue to overlook both the changes in student's real-world literacy landscapes and the new literacies these students are using to realize their real-world aspirations, they do so at "great cost to our world and to our children" (p. 6). It is the intent of this study to research, describe, and begin to understand some of the seemingly very different ways that these new literacy practices are acquired by, taught to, and learned by, some of the youngest learners in our society.

### **1.2 Purpose of Study**

Fortunately, there is a growing body of research exploring the new literacies that students learn while using ICTs in out-of-school settings and it offers some promising insights into how K-12 literacy educators can best prepare students for the literacies they will require today and in the future (e.g., Coiro, 2008; Henry, 2006; Hull & Schultz, 2001, 2008; Lankshear & Knobel, 2007; Marsh, 2003; McVee, Bailey, & Shanahan,

2008). Within this body of research, however, little academic discourse has focused on how the social practices of teaching and learning new literacies at home shape and structure primary-aged children's language and literacy, and, in turn, how these new literacies shape and frame these students' social practices and identities.

Recognizing that large numbers of primary-aged children living in developed countries come to school with experience using multiple new ICTs (Rideout & Hamel, 2006), that by age ten many are independently using these new ICTs (Media Awareness Network, 2005; Riley, 2007), and by the of age fifteen the majority of students have successfully learned many of the basic skills, knowledge and dispositions required to be functionally literate in their ability to use these new ICTs (Organization for Economic Co-operation and Development, 2006; Raine, 2009; Zamaria & Fletcher, 2007), one wonders how these primary aged-children are learning to use these new ICTs in out of school settings.

The purpose of this study is to begin closing this knowledge gap. More specifically, the research was designed to: (a) access and generate detailed qualitative data that describes the types, patterns, and principles of new and multiple literacy learning and teaching of meaning-making practices seen naturally occurring within the homes of families whose kindergarten children (5- or 6-year-old children) regularly access and use home-based ICTs; and (b) to analyze and interpret these data in an effort to develop a contextually sensitive critical interpretation of primary children's new and multiple literacies and teaching/learning practices and principles.

### ***1.3 Research Questions***

Three specific questions have been developed to generate descriptive data representative of how primary-aged children are taught and come to learn new home-literacies practices while using ICTs. They are as follows:

1. What home teaching/learning contexts exist for 5-year-olds learning to use new ICTs?
2. Who is teaching 5-year-olds how to use new home-based ICTs?
3. What learning and/or teaching principles do subjects demonstrate in the interactions between family members, friends and 5-year-old learners as they directly or indirectly teach the 5-year old to use new ICTs in the home setting?

#### **1.4 The Study's Significance**

The potential impact of this study is both immediate and long term. First, data from this study has the immediate potential to help parents and literacy educators begin to recognize the very diverse and complex set of literacy practices and “cultural capital” (Bourdieu, 1977) that their children learn at home and bring to school. Additionally, these data have the potential to help parents and educators begin to see the importance of developing their own and their children’s abilities to critically engage with these new and rapidly developing literacy learning and teaching practices. For example, one parent from this study indicated that her family’s participation helped her overcome negative stereotypes she had about using a computer with her 5-year-old. She stated,

I must say being part of the study has been good for me in terms of it has taken [away] some of the fear. I don’t know if it is fear but the cautionary tales. I mean you get bombarded by media and some of those dateline things with how negative the computer can be. I am much more open minded to the fact that it can be a tool, an educational tool. Whereas before I didn’t think I saw it as that, which is, I appreciate, that is, I think we will make future use of the computer.

Furthermore, this research provides data that will, in the longer term: (a) begin identifying and understanding the new and multiple literacy practices and principles taught and learned in the home setting for an age group largely overlooked in current research investigating new and multiple literacies (this alone is significant considering

the academic importance educators place on early emergent reading and writing (e.g., International Reading Association and National Association for the Education of Young Children, 1998; Purcell-Gates, 1996; Strickland, 2002), yet the bulk of multiple literacy research involves intermediate and secondary students); (b) provide parents and educators with detailed descriptions of the home-based new ICT teaching and learning practices of their primary children which in turn can lead to the development of curriculum and learning opportunities more relevant and applicable to their children's everyday life experiences, and (c) provide launching points for future research into understanding if and how these new, ICT-based, at-home literacies can be successfully incorporated into the classroom.

In summary, answers to these research questions are important because they can assist parents and literacy educators to understand complex changes occurring in primary children's literacy practices today. More importantly, findings from research that investigates the social practices and instructional principles associated with the learning and teaching of new literacies in primary-aged children's home settings has the potential to assist in the development of literacy practices that can successfully prepare children for current and future forms of communication.

### **1.5 Chapter Summary and Chapter 2 Preview**

As is metaphorically conveyed in the Snyder (1990) quote at the start of this chapter, something as innocent as a 21st century father reflecting upon the observed everyday communication differences between his daughter and himself can reveal engaging questions into young children's literacy and learning that hold as much theoretical and pedagogical 'bite' as investigations into the potentials released (and inhibited) through the act of moving from an oral culture to a written culture (Ong, 1982). Chapter 1 introduced some troubling issues and questions associated with children

learning to use new home-based ICTs, presented the study's research questions, and discussed the importance of the study. Chapter 2 situates the study within existing theoretical frameworks, and presents a review of the theory and empirical work conducted in the area of literacy and learning in out-of-school contexts.

## Chapter 2: Literature Review

### **2.0 Introduction**

This chapter is divided into three sections. The first section presents the three literacy and learning theories guiding this study: sociocultural theory, situated learning, and new literacy studies. The second section presents two visual models (the Support to Independence model and the Four-stage Experiential Learning Cycle model) that inform current research into ICT-mediated learning and literacy development. And the third reviews literature exploring three clusters of research related to the current study, including: (a) research investigating young children's ICT mediated literacy and learning; (b) out-of-school literacy and learning research; and (c) research investigating the influence of family members and peers on a young child's ICT-mediated learning and literacy development.

### **2.1 Theoretical Orientations**

This study was situated within the theoretical frameworks of sociocultural learning (Vygotsky, 1978), situated learning (Lave, 1988; Lave & Wenger, 1991), New Literacy Studies (New London Group, 1996), and discourse communities (Bizzell, 1992; 1999; Gee, 1996; Nystrand, 1997; Swales, 1988). These theories were chosen for four main reasons. First, they provided the opportunity to explore and begin to understand the dynamic complexity (the overlapping, intertwining, and nestedness) observed in the teaching and learning practices and systems that occur when children use and learn to use new home-based ICTs (Davis, Sumara & Lince-Kapler, 2008). Second, they provided the framework from which to draw out and develop important conceptual understandings common to a wide variety of successful learning and teaching contexts, including home and school. Third, as a group, these theories presented the possibility of imagining and re/developing vibrant new "road maps" or approaches to thinking about the theory,

pedagogy, and theory-pedagogy that fit within, over, between, and around these current theoretical frameworks and presuppositions.

### **2.1.1 Sociocultural views of literacy and learning**

Current sociocultural conceptualizations of literacy and learning (e.g., Lave & Wenger, 1991; Rogoff, 1990; Wertsch, 1998) can trace their roots in large part to theoretical and empirical work conducted by cognitive psychologist Lev Vygotsky (1962, 1978). Vygotsky's work contains two core concepts foundational to sociocultural theory. The first concept is that the development of human learning, thinking, and knowing is an active process that is fundamentally tied to socially, culturally, historically and institutionally situated contexts, groups, and events.

Vygotsky (1978, p. 57) stated, "every function on the child's cultural development appears twice; first, on the social level, and later, on the individual level; first between people (interpsychological) and then inside the child (intrapsychological)". For Vygotsky, what and how children learned was primarily mediated by social experiences and practices as opposed to being solely governed by an individual's natural cognitive development. Thus sociocultural theorists view literacy acquisition and learning as being inextricably associated with "and understood in relation to, the context in which those practices are culturally, historically and ideologically situated" (McTavish, 2010, p. 8).

The second core concept is associated with Vygotsky's belief that biological development occurred alongside humankind's active search to appropriate psychological tools (e.g., language and signs such as writing, pictures, maps, math symbols, and so on), and that the acquisition of these tools was a social activity that fundamentally shaped and transformed human mental processes. In other words, psychological tools and artifacts not only helped humans communicate and get work done, but they simultaneously helped inform individuals of their social group's historical and cultural experiences, heritages and

aspirations. In this sense, sociocultural theorists not only view language as being inextricably linked to human learning, but that this learning is also: (a) distributed and mediated across sociocultural contexts; (b) occurs in an artifact-saturated medium; and (c) is a precursor to development (Cole & Wersch, 1996).

Noting that interpersonal interactions were essential precursors to intrapersonal learning, Vygotsky also proposed that *more knowledgeable others* (often adults) use sociocultural interactions to actively and collaboratively support and guide a child's language and learning (Vygotsky, 1978, p. 86). He suggested that this guided instruction would best take place in a child's Zone of Proximal Development (ZPD), an area between "what an individual is able to achieve or understand on their own, and what an individual is able to achieve in conjunction with a more expert 'other' – whether this 'other' is a person or a resource" (Sefton-Green, 2004, p. 12). Vygotsky concluded that teaching and learning in the ZPD "awakens a variety of internal development processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers. Once these processes are internalized, they become part of the child's independent developmental achievement" (Sefton-Green, 2004, p. 90).

These two core Vygotskian concepts have been the foundation for a flourishing body of sociocultural literacy and learning theory. For example, Rogoff (1990; 1995) drew on Vygotskian theory (as well as work by Cole & Scribner, 1981; Luria, 1981; and Wertsch, 1985) to explain children's development and learning that occurred in several U.S. daycares in which she was researching. From her observations she theorized that children's development could be conceived as the interaction of three different but inseparable social situations (or planes): the personal (or individual), the interpersonal (between individuals), and the community (Rogoff, 1995). She also noted that each of these planes required different approaches of instruction which she called participatory

appropriation (for individual), guided participation (between individuals) and apprenticeship (involving a community). She noted that,

Guidance and participation in culturally valued activities are essential to children's apprenticeship in thinking. Guidance may be tacit or explicit, and participation may vary in the extent to which children or caregivers are responsible for its arrangement. (p. 8)

Rogoff proposed that it was through culturally-mediated guided participation that caregivers apprenticed children into the caregiver's culture and through which the majority of the child's learning and development occurred.

Central to sociocultural research like Rogoff's is the belief that individuals learn and learn to be literate through informal and formal sociocultural activities and interactions with each other. Thus instead of learning being seen as the transfer of knowledge, skills and understandings from those who have learned more to those who have learned less, learning is seen as a collaborative construction of these meanings. Such theory, then, emphasizes the active and collaborative role that children take in their own language and literacy development, and legitimizes learning across communities.

### ***2.1.2 Situated learning***

Centering itself firmly within a sociocultural view of learning, Situated Learning (SL) theory also embraces the belief that learning does not take place in the heads of individuals but instead occurs through social development (Lave & Wenger, 1991, p. 13). SL theorists cite Vygotsky and the English philosopher Oakeshott (Minogue, 1964) when emphasizing this point. Oakeshott proposed that learning was a social activity that required a community of practice (a group of people sharing common interests, crafts, professions) which he called an idiom of activity. He stated, "all actual conduct, all specific activity springs up within an already existing idiom of activity. And by an 'idiom of activity' I

mean a knowledge of how to behave appropriately in the circumstances” (p. 101).

Consequently, SL theorists try to understand the social relationships and social contexts in order for learning to take place, rather than trying to explain the cognitive processes and conceptual structures individuals use to acquire or transmit specific types of knowledge (Hanks, 1991, p. 14).

Brown, Collins, and Duguid (1989) articulated an early theory of situated learning that proposed that knowledge and learning were fundamentally influenced by, and contextually situated within, the activity and culture in which they were used. They argued that, “all knowledge is, we believe, like language. Its constituent parts index the world and so are inextricably a product of the activity and situations in which they are produced” (p. 33). In other words, and like SL theorists in general, they conceive human learning and human activity/experience as being two parts of a mutually constitutive and interactive relationship.

Lave and Wenger (1991) extended this notion arguing that human experiences and learning actively occur within and across a wide variety of formal and informal contexts, or *communities of participants*, who they define as “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger, 2007, p. 3). The concept of community of participants is one where participants not only share technical knowledge, tools or tasks, but where participants learn through a system of self organizing social interactions and relationships, while developing a common identity.

Within these communities of practice, SL theorists propose that a great deal of learning occurs through mentoring, coaching, and apprenticeships. However, the type of mentoring that SL theorists propose does not include “conventional explanations [that] view learning as a process by which a learner internalizes knowledge, whether

'discovered,' 'transmitted' from others, or 'experienced in interaction' with others" (Lave & Wegner, 1991, p. 47).

Additionally, SL theorists do not view mentoring as a process where more knowledgeable others (or masters, old timers, experts, and teachers) transmit decontextualized and abstract knowledge to less knowledgeable others (or amateurs, newcomers, novices and learners). Instead, mentoring is understood as a situated learning process where competency is co-constructed through a constantly changing process of socially mediated interactions amongst community participants within specific social and physical environments (Brown, Collins, & Duguid, 1989, p. 33). In other words, novices learn through everyday social practices.

Lave and Wegner term this type of mentoring *legitimate peripheral participation* (LPP). They note that when a newcomer either wants to join, or wants to see if they want to join, a community of participants, they start off by observing old-timers (people who have a great deal of experience participating in the community) from the community's periphery. Whether newcomers are formally introduced to old timers quickly, as in a job interview, or more slowly, as a child watching other children play at an unfamiliar playground, eventually old-timers take note of the newcomer (or the newcomer asks the old-timer for assistance) and the old-timer introduces (unconsciously and/or consciously) the newcomer to the social structures and frameworks of the community. Then as the newcomer becomes more competent with the community's social structures and frameworks, they become more engaged with the community's main body of knowledge and practices, and progressively develop practices and identities more closely aligned to those of the old-timers. Lave and Wegner (1991) explain LPP as such,

Learners inevitably participate in communities of practitioners and...the mastery of knowledge and skill requires newcomers to move toward full participation in the

sociocultural practices of a community. 'Legitimate peripheral participation' provides a way to speak about the relations between newcomers and old-timers, and about activities, identities, artefacts, and communities of knowledge and practice. A person's intentions to learn are engaged and the meaning of learning is configured through the process of becoming a full participant in a sociocultural practice. This social process includes, indeed it subsumes, the learning of knowledgeable skills. (p. 29)

Furthermore, as newcomers become more involved in the community they can also contribute new physical and psychological tools to the community which, if sanctioned, change the existing structures and activities enough that the old-timer's participation becomes more peripheral. This constantly evolving nature of the learning structures in a community ensures that everyone is, to some degree, considered to be a newcomer. Thus SL theorists view learning to be more than merely a prerequisite for membership into the community of practice. Instead, learning *becomes* a constantly evolving form of membership (p. 53).

Lave and Wegner (1991) also reject conventional characterizations of Vygotsky's ZPD that only provide an "aura of socialness that provides input for the process of internalization viewed as individualistic acquisition of the cultural given" (p. 48). However, they do accept views of the ZPD that characterize it as the "distance between everyday actions of individuals and the historically new form of the societal activity that can be collectively generated". Learning within the ZPD is less about internalizing transmission-oriented knowledge (whether interactively experienced or not) and more about the "historical production, transformation and change of persons" (p. 51).

Also like Vygotsky, SL theorists suggest that the active use of any physiological and psychological tools (including technologies) plays a key role in determining how

learning occurs. They propose that such tools not only “expand the power and flexibility of the resources that [could] be deployed to support the various components of situated learning” (McLellan, 1996, p 12), but that they play a central role in acculturating novice learners into the community of practitioners’ experience and knowledge domains. Brown, Collins, and Duguid (1989) explain this point,

Communities of practitioners are connected by more than their ostensible tasks. They are bound by intricate, socially constructed webs of belief, which are essential to understanding what they do (Geertz, 1994). The activities of many communities are unfathomable, unless they are viewed from within the culture. The culture and the use of a tool act together to determine the way practitioners see the world; and the way the world appears to them determines the culture's understanding of the world and of the tools. Unfortunately, students are too often asked to use the tools of a discipline without being able to adopt its culture. To learn to use tools as practitioners use them, a student, like an apprentice, must enter that community and its culture. (p. 33)

Thus when a new member learns how to employ the tools of a community of practice, they do more than just learn to use the tools. They also concurrently connect to the history of the tool’s development and its employment in that community, as well as develop practices that shape their own cultural practices to more closely align to those in their community, and vice versa (Lave & Wegner, 1991, p. 101).

Other common components of learning proposed by SL theorists include: (a) stories play a role in the situated social construction of knowledge and in helping a community of practice learn, remember and understand (Egan, n.d.; Lave & Wegner, 1991); (b) learning is not just an active experiential social process, but it also includes active reflection (Herrington & Kervin, 2007; McLellan, 1996); (c) social collaboration is

common in situated learning contexts (especially for online networked communities of practice) where “ideas are exchanged and modified, and belief systems developed and appropriated through conversation and narratives” (Brown, Collins, Duguid, 1989, p. 40; Herrington & Kervin, 2007); (d) learning through repeated practice is viewed as an “integral part of generative social practice in the lived-in world” (Lave & Wegner, 1991, p. 35); (e) language is a psychological tool that participants learn to use in meaningful everyday interactions in the context of their community of participants (e.g., know how to talk and be silent), in order to learn, develop an identity, and become full participants in that community (Lave & Wegner, 1991, pp. 105-108); and (f) apprenticing new members into the community is best situated in the real world context and through those practices of the community which expose new members to “the full range of analog information that students need in order to become skilled” (Tripp, 1996, p. 155).

In summary, SL theorists propose that learning is maximized when situated in real world learning contexts where more competent members of a community apprentice newcomers into the sociocultural practices and contexts of the competent members’ community.

### ***2.1.3 New Literacy Studies***

In the early 1980’s, scholarly work by Gee (1989, 2008b) and Street (1993, 1994, 1995) pulled together many significant paradigmatic threads that were shifting and advancing learning and literacy theory and research in sociolinguistics, critical literacy theory, discourse analysis, and activity theory. Their writings interlaced the threads from these prevailing theories into a new theoretical paradigm, now called the New Literacy Studies (NLS). They argued for a continued and increased move away from the then still dominant cognitive psychological theory of human learning, towards a sociocultural learning theory. The former emphasized learning that occurs within an individual’s head,

and the latter emphasized the role social interactions play in human learning (Lankshear & Knobel, 2003a).

Much of Gee's work was based in linguistics and sought to explain the relationships between identity and literacy. In so doing, he proposed that humans used literacy as an "identity tool" to affiliate themselves with a particular group or groups. Similarly, he theorized that each group created and utilized unique discourse patterns (Gee, 1989). There were "d" discourses to describe the language learned and used during social interactions, and "D" Discourses describing "ways of being in the world, or forms of life which integrate words, acts, values, belief, attitudes, social identities, as well as gestures, glances, body positions and clothes" (Gee, 1996, p. 142). Drawing on Foucault's (1990) concept of dialogue and Bakhtin's (1981) concept of dialogism, he further theorized that these discourses/Discourses changed as they interacted with each other and were influenced by physical and historical contexts. By considering literacy as being constructed within, between and across Discourse groups, Gee provided literacy scholars with "a frame for understanding the connections between literacy, culture, identity, and power" (Hull & Schultz, 2001, p. 585).

Drawing upon ethnographic research into the literacy practices of villagers in Iran, Street (1984) demonstrated that literacy was not a neutral tool and was, instead, tied closely to a variety of other social, cultural, political, and economic factors. He also reaffirmed research by Heath (1983) and Labov (1972) that found school literacies took on a hegemonic role for those students not conversant with school Discourses, even though these students' home and/or out of school discourses were very complex and sophisticated. Street's unique contributions to NLS was to encourage literacy scholars and educators to view the multiplicity of literacy both in and out of school and to view a literacy norm as something school imposes on society.

Both Gee and Street argued for a new definition of literacy which formed the foundations of NLS theory. The principles they proposed are:

- 1) Learning and literacy are patterned by social and cultural practices.
- 2) Learning and literacy are shaped by history and historically situated.
- 3) Different spheres of life require different literacies (multiple or multi literacies).
- 4) The 'Discourses of larger political and social institutions (e.g., school, and work) interact with, and shape, the "discourses" shared by local or personal groups of people (e.g., family and friends) (Gee, 1989).
- 5) "Discourses are intimately related to the distribution of social power and hierarchical structure in society" (Gee, 2008b, p. 162).
- 6) Learning and literacy practices are always changing.

At the same time Gee and Street were configuring the theoretical foundations for NLS, the effects of two unprecedented changes in human activities were occurring on a global scale. First, affordable air travel and networked ICTs provided for the intermixing of cultural practices and societal discourses. And second, a proliferation of ICTs like the Internet had grown exponentially and had digitally linked Europe, Australia, North America and other developed countries. The former change created an awareness and experience of literacy that was less monolingual and monocultural, and the latter increased human beings' access a greater variety of text forms and representational tools.

In 1994, 10 literacy and educational theorists from Australia, the United Kingdom, and the United States of America, gathered in New London, New Hampshire, U.S.A, to discuss the implications of these trends and the impact they may have on literacy in the future. After more than a year of meetings they named themselves the New London Group (after their meeting place) and they published their literacy manifesto in an article

titled *A Pedagogy of Multiliteracies: Designing Social Futures* (New London Group, 1996). The document proposed a new literacy pedagogy of multiliteracies, that echoed Gee and Street's call for a much broader, flexible, inclusive, and interactionist view of literacy. Building their dialogue from a variety of disciplines, but situating their argument firmly in critical literacy and NLS theory, they argued for a new literacy theory, research, and pedagogy aimed at assisting humans to critically and actively negotiate, both privately and publicly, society's burgeoning and constantly changing ICTs, increasing hybrid text forms, and pluralities of cultural and linguistic dialogues. They stated,

...that the use of multiliteracies approaches to pedagogy will enable students to achieve the authors' twin goals for literacy learning: creating access to the evolving language of work, power, and community, and fostering the critical engagement necessary for them to design their social futures and achieve success through fulfilling employment. (p. 60)

Despite the possibility of clashing with a well funded and growing accountability-driven back-to-the-basics movement happening in the early 90s (Darling-Hammond, 2010), the release of the New London Group's pedagogy of multiliteracies was followed by dramatic reconceptualizations of literacy and learning across the field of education. For example, Eisner (1997), a critical arts theorist, and Greene (1997), an educational philosopher, responded one year later focusing on the impact that the restrictive nature of traditional language (and numeracy) pedagogy had on human cognition and representation. Both argued that different forms of representation develop different forms of cognitive abilities, and that the singular emphasis on rational thinking associated with reading and writing text (often English text) marginalized both the opportunities for divergent thinking and limited each individual's unique way of sensing the world. Furthermore, Eisner (1997, p. 353) argued that curriculum should be

redesigned to embrace both the differences and commonalities in our students' forms of representations. Greene (1997, p. 394) argued that much more emphasis should be put on developing students' abilities to make meaning and communicate through artistic representation.

Similarly, NLS explorations into the multimodality and semiotic hybridism of multiliteracies were either reinforced and/or were further reified by the New London Group's manifesto. Drawing on theories of discourse analysis and social semiotics, Kress (1997) researched the multiple ways in which children created meaning (e.g., drawing, writing, and collages) and concluded that they are not so much "language users" as they are "makers of language". That is, children employ a variety of semiotic systems (which he terms multimodalities) when constructing meaning, and that the modalities they select are imbedded and heavily governed by the social and cultural tools and systems available (Kress, 2000, 2003, 2004). Using arguments that draw heavily on discourse analysis, social semiotics, and activity theory, Kress emphasized the importance of encouraging students to express themselves using multimodal symbol systems, as it is more reflective of the complexity and plurality of symbol systems used to communicate within authentic social situations.

One of goals central to NLS is to provide direction to literacy scholars and educators in times where ICTs and associated multiliteracy practices are being realized and shifting at a rapid rate (Cope & Kalantzis, 2000). Because NLS theorists take a critical perspective on literacy, school Discourse is not given any more value than out-of-school discourses. However, this review of the literature found that the majority of NLS research has been conducted outside the physical walls of school. And indeed,

Perhaps more than any other theoretical tradition, NLS has embraced out-of-school contexts, almost to the exclusion of looking at schools, and has

unabashedly valued out-of-school literacy practices as distinct from those associated with schools. (Hull and Schulz, 2001, p. 589)

However, Street (2003) notes that although much NLS research occurs in out-of-school contexts, NLS theorists ultimately wish to, build upon the foundational descriptions of out-of-school literacy events and practices developed within NLS, to return the gaze back to the relations between in and out of school, so that NLS is not seen simply as "anti school" or interested only in small scale or "local" literacies of resistance. They especially want to use the understandings of children's emerging experiences with literacy in their own cultural milieus to address broader educational questions about learning of literacy and of switching between the literacy practices required in different contexts. (p. 83)

NLS theorists view literacy as inextricably linked to human learning. When exploring the need for educators to prepare students for the 21<sup>st</sup> century, Gee (2008a) makes the relationship between literacy and learning very clear, stating, "the foundation for all learning is basic literacy" (p. 4). Thus for NLS theorists, literacy is closely related to learning, includes communication through reading and writing, but also values literacy inclusive of other forms of communication and in sociocultural communicative contexts.

NLS theory has particular relevance to this study in that it offers the opportunity to explore children's learning and literacy development in light of the new and multiple communication and meaning making practices that new ICTs are offering young children.

#### ***2.1.4 Discourse communities***

Originally coined by Nystrand (1982), and later developed by Swales (1988) and Bizzell (1992), the term discourse community refers to all the tangible and intangible

forms of communication which shape a particular group of people's way of thinking, acting and discoursing. Additionally, Bizzell argues that to be part of a discourse community a potential member must not only need to learn the language of that community, but they must also learn to understand the concepts, expectations and practices of that community and the way they shape and define how language and meaning can be used and constructed. In a discussion on the unique practices of different writing discourse communities Bizzell (1992) argues,

Producing text within a discourse community, then, cannot take place unless the writer can define her goals in terms of the community's interpretive conventions.

Writing is always already writing for some purpose that can only be understood in its community context. (p. 89)

This concept that humans self organize into groups based both on their language-in-use and through shared understandings, rules, practices, habits, traditions, actions, thoughts, behaviours, values, gestures, and so on, is central to Gee's (1996) concept presented earlier that people can be members not only of their first-learned primary discourse, but of many Discourses. He suggests,

Discourses are ways of being in the world, or forms of life which integrate words, acts, values, beliefs, attitudes, and social identities, as well as gestures, glances, body positions, and clothes. A Discourse is a sort of identity kit which comes complete with the appropriate costume and instructions on how to act, talk, and often write, so as to take on a particular social role that others will recognize. (p. 127)

Additionally, Gee argues that children are socialized at home into their first discourse which he terms a Primary Discourse. Secondary Discourses are those which the child learns through participation in a variety of social groups, organizations and institutions

outside the home. This notion that children participate in multiple Discourses draws the attention away from a concept of literacy and learning as something that is just a product of talk and language-in-use alone. Instead it suggests that these processes are complex multifaceted social processes that occur across multiple contexts and discourse communities, including the home.

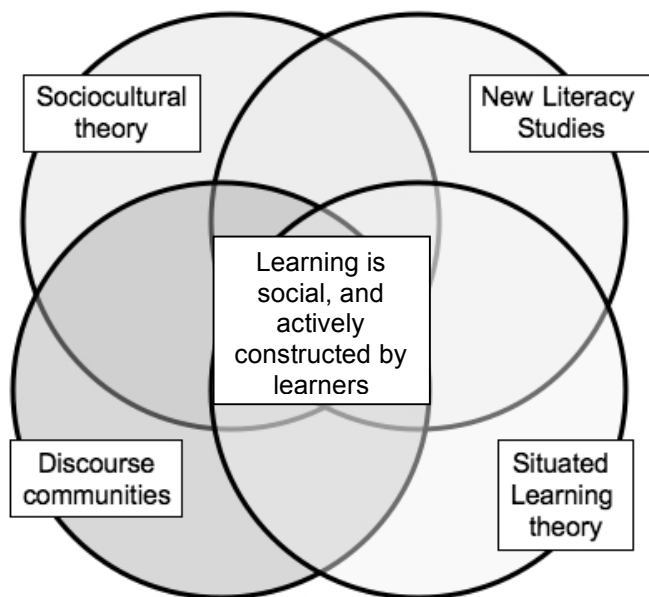
### **2.1.5 Summary**

The four theories selected to guide this study provide a lens through which to explore: (a) the sociocultural patterns indicative of what and how young children and their families learn and become literate using home-based ICTs; (b) the important role situated communities of practice can have on the development of skills, knowledge and understandings particular to, and distributed across, unique communities of practice; (c) the potential that new ICTs have in developing and shaping the multi modal and multiple literacies of young Canadian children today; and (d) the concept that learning and literacy is developed across multiple Discourse communities.

Each of the four theoretical orientations offers unique perspectives on human learning and literacy acquisition. Sociocultural theory provides an emphasis on viewing learning and literacy acquisition as a process in which children are continually challenged and mentored by more capable others. Situated Learning theory provides an orientation for exploring the role context plays in determining how young children learn and become literate, as well as presenting frameworks for explaining how novices are apprenticed into the world of more capable others. New Literacy studies offer perspectives on learning that move away from a monolingual and monomodal approach to literacy and learning, and instead reconceptualize human meaning making as engaging multiliteracies and multimodalities. Theories emphasizing discourse practices focus on understanding learning and literacy in relation to multiple Discourse

communities, and the potential that understandings of one community may have across multiple communities.

Although each theoretical orientation is different, all four conceptualize literacy and learning as a process that does not occur solely in the head of the learner and is not just a matter of mastering a set of skills and competencies. Instead, these orientations present learning and literacy as an active social process where meaning making is largely constructed within, and shaped by, cultural interactions and historical circumstances. Figure 1 illustrates how this study not only seeks to draw upon the overlapping and interconnectedness of the theory supporting each orientation, but also to draw upon the unique perspective each orientation brings to the analysis of this study's data.



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Figure 1. Interconnected theoretical framework.

## 2.2 Two Models of ICT-mediated Learning and Literacy Development

The following section introduces two visual models developed by theorists seeking to explain the social nature of learning and literacy development. These images will be used as the springboard for the development of a learning model developed in chapter 6.

### 2.2.1 Support to independence model

Designed from Vygotsky's (1978) theory of the Zone of Proximal Development, the *Support to Independence* model of learning (see Figure 2) was developed by

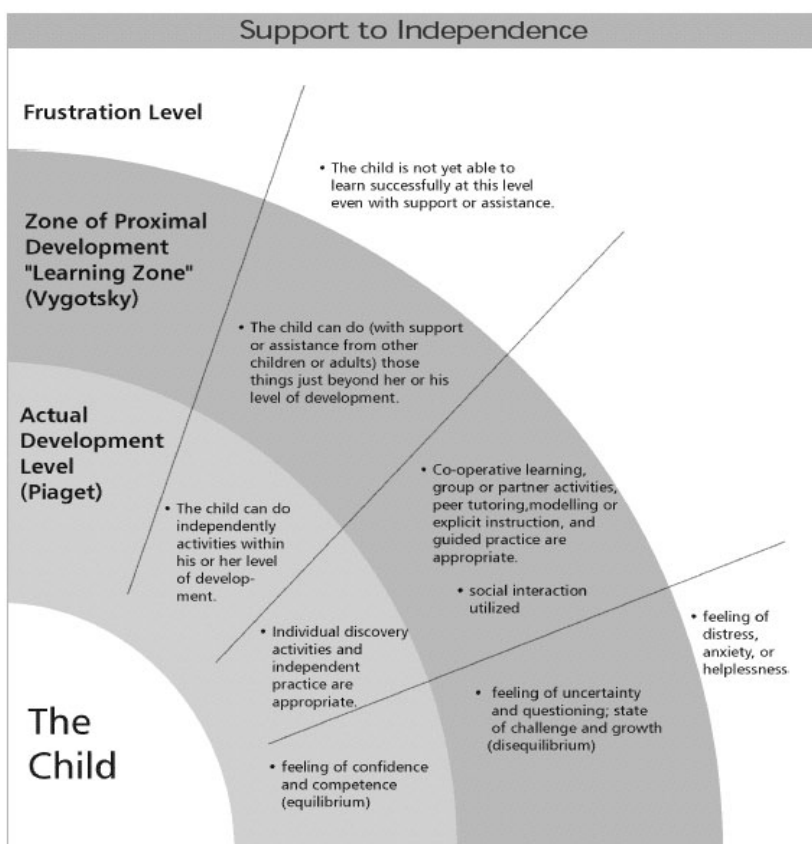


Figure 2. Support to Independence model of student development (Chapman et al., 2000).

Chapman for the British Columbia Ministry of Education's Primary Program Document (Chapman et al., 2000, p. 84). According to the authors of this document, the model "shows the relationship between children's independent and instructional levels and how teachers may provide [a child] support toward independence" (p. 84). The model represents a Vygotskian concept of learning and literacy development where more capable others (in this case, teachers) encourage and challenge a child to move outward from their "independent zone" of emotional, social, and physical development into their "learning zone" a place where the child is challenged to learn and attain new abilities with support (scaffolding, modeling, tutoring, and so on) from a more capable other.

The strengths of this model are that it acknowledges both the social purposes and dynamics of learning and literacy development, and the individual's ability to engage in activities and reconfigure understandings and experiences within their sets of learned abilities, knowledge, attitudes, and so on. Furthermore, the model suggests that learning is an outward movement into areas of challenge and growth, and that learning is not firmly locked into sequential steps or stages. Such a model leaves the process of learning open to a myriad of possibilities and routes.

Unfortunately, even considering all the strengths of this model, it still doesn't clearly represent: (a) how more competent others interact with the child in the child's learning zone; (b) how learning with and between others with varying degrees of competency occurs; and (c) how children unlearn or forget knowledge, abilities, and skills.

### ***2.2.2 Kolb's four-stage experiential learning cycle***

In attempting to encapsulate Lewin's (1951) 'field theory' and Dewey's (1938/1997) theory of 'continuity of experience', Kolb (1984) created the four-stage

experiential learning cycle (see Figure 3). In this cyclic model, learning is seen as an ongoing experiential cyclic process where “a participant has a concrete experience, followed by reflective observation, then the formation of abstract conceptualizations, before finally conducting active experimentation to test out the newly developed principles” (Neil, 2004). Exeter (2001) added that the process of testing and confirming principles leads to the application of learning to new experiences which in turn leads to the transformation of learned knowledge, attitudes, skills, abilities, and so on (this is represented by the dotted line in Figure 3).

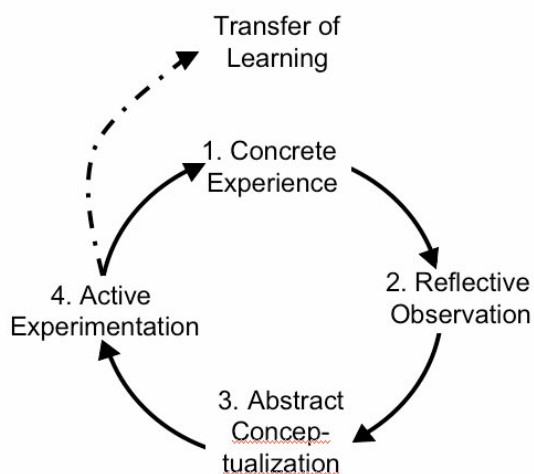


Figure 3. Kolb's (1984) four-stage experiential learning cycle. Dotted line added by Exeter (2001).

The strength of this model is in the ongoing ‘flow’ of learning in a cyclic fashion in which learning stages common to most learning can be discerned. Furthermore, the model helps theorists view learning as both a private and public affair. For example, stages one and two of the model offer the opportunity to look at learning as an internal or private affair, whereas stages three and four presents learning as a public or ‘external’ activity.

However, learning theorists often critique Kolb's 4 stage model of learning as being unrealistic, static, prescriptive, and simplistic (Greenaway, n.d.). Sociocultural learning theorists (e.g., Quay, 2003; Seaman, 2007) further argue that such models define "experiential learning as a psychological, stepwise process that offers limited insights into a complex practice rich with dynamic physical and social interactions" (Seaman, 2007, p. 5).

### **2.2.3 Summary**

While these models offer valuable frameworks for examining young children's literacy and learning practices, they do not provide adequate structure for visualizing and examining the specific teaching and learning principles children demonstrate when learning and acquiring literacy while using new home-based ICTs.

### **2.3 Review of Empirical Research**

The remainder of this chapter synthesizes the available empirical research examining how children use and learn to use new ICTs. Moreover, because this study views learning and literacy development (or learning to be literate) as inseparable, there is an emphasis on studies that concurrently explore the principles of young children's learning and literacy development. More specifically, the researcher presents a synthesis of the empirical research exploring: (a) the general research surrounding young children's ICT-mediated literacy and learning; (b) research surrounding young children's ICT-mediated literacy and learning in out-of-school contexts; and (c) the roles family members play in helping children learn to use new ICTs and develop related literacies.

The empirical research presented also focuses on researching the experiences of children between 4- and 8-years-of-age. Any literature that focussed on children from these age groups was included, unless the majority of children in the study fell outside

the age range and/or the findings for children within the age range could not be separated from those for children falling outside 4- to 8-years-of-age.

The choice to focus on literature for 4- to 8-year-olds was predicated on two rationales. First, the age group fell close to the ages of the participants in this study. Second, current empirical research (Dwyer, 2007; Subrahmanyam, 2001) indicates that young children's (four- to 8-year old's) use of new ICTs and literacy development can be very different than older children's (9- to 15-year-old's).

For instance, recent out-of-school research by Hundley and Shyles (2010), Lin, Cheong, Kim and Jung (2010), Luckin et al., (2009), and Vekiri (2009) found that pre-teens and teens largely used new ICTs to play games, play music, text message and retrieve online content. On the other hand, out-of-school research by Selwyn, Potter and Cranmer (2009) found that primary children primarily used new ICTs to write, draw, create pictures, and play basic gaming. Consequently, the reported differences between primary and intermediate students' use of new ICTs prompted a literature review focusing on 4- to 8-year-olds' literacy and learning while using new out-of-school ICTs.

### ***2.3.1 Research investigating young children's ICT mediated literacy and learning***

There is a growing body of research exploring young children's learning and literacy development while using computers both in the home and in the classroom. This section explores literature that occurs in contexts other than the home (e.g., schools, after school programs, daycares, and so on), and presents the research in two subsections. Presented first is research focusing on children's literacy development while using new ICTs. Second, the literature focusing on how children come to learn to use new ICTs is presented.

### 2.3.1a Literacy development

Extensive literature reviews investigating young children's (0- to 8- year-old's) ICT-mediated literacy development have been conducted by Kamil, Intrator and colleagues (Kamil et al., 2000; Kamil & Intrator, 1998; Kamil & Lane, 1998) and Lankshear and Knobel (2003b). Combined, these two research teams have uncovered 904 documents on the topic, of which they judged only 49 to be grounded in empirical research (e.g., funded research reports, doctoral dissertations, research-based reviews of literature, and article empirical research). The remaining 855 documents were not included in their reviews as these were either software and or hardware reviews, or consisted of "commentaries, opinion, discussion, and theoretical ruminations" (Lankshear & Knobel, 2003b, p. 65).

Both Kamil and Intrator (2000) and Lankshear and Knobel (2003b) found there to be a paucity of empirical research into young children's ICT-mediated literacy development. They also noted that this lack of research was alarming, especially considering the inroads technology had made into schools, homes, and the daily lives of young children in many developed countries. Similarly, both teams found that the existing empirical research investigating children's technology-mediated literacy development did not present a globally diverse view of this topic as the research "continues to be swamped by work from the USA" (p. 67). Moreover, the vast majority of the corpus of literature reviewed by the researchers had a heavy cognitive and quantitative orientation to it, and/or focused on determining how children were taught to encode and/or decode written text. Lankshear and Knobel (2003b) concluded,

Needless to say, the corpus of studies is swamped by an emphasis on developing a generic capacity to encode and decode alphabetic print rather than to promote competence as 'insiders' of practices and discourse

communities that extend beyond conventional classroom reading and writing. (p. 77)

As a result, Lankshear and Knobel make an appeal to literacy scholars to conduct empirical research that explores the sociocultural aspects of 'pedagogy in action' and seeks to describe and understand "the kinds of literacy education experiences required for higher level participation in the kind of knowledge–information society described by leading theorists" (p. 78).

Using Lankshear and Knobel's (2003b) key word searches (pp. 64-66) and research classification matrix continua (pp. 74-75), and the University of Victoria's and the University of British Columbia's wide array of online library catalogues, indexes, and databases, a literature search was conducted for empirical research investigating new technologies in young children's literacy development published between January 1, 2002 to June 30, 2010. Similar to Lankshear and Knobel, it was found that non-empirical documents still overwhelmingly dominated the current corpus. Also similar to the two previous reviews, a large number of studies (85 of 98) fell towards the 'Print' and 'Encoding/Decoding' end of Lankshear and Knobel's classification matrix continua. These studies investigated varying facets of young children's' abilities to encode and decode conventional alphabetic texts and/or focused on stand-alone and non-interactive contexts. Findings representative of this corpus included: (a) some individual children found the visual and auditory qualities of multimedia simulations and animations helped them build mental models and improve comprehension (Kamil et al., 2000 p. 776); (b) computers increased motivation, interest in, and enjoyment of, schoolwork, involvement in tasks and time on task (Lankshear & Knobel, 2003b, p. 63); (c) computers fostered moderately increased levels of interactions and collaboration between students (Kent & Rakestraw, 1994); and (d) children who were introduced to unfamiliar words through

compact-disk read-only memory (CD-ROM) animations were more likely to learn the meaning of an unfamiliar word (Higgins & Cox, 1999).

However, unlike the research leading up to 2003, studies published over the last 8 years now also originated from countries other than the U.S. Indeed, about two thirds of the studies were still coming from the U.S., but now perspectives from the U.K. (e.g., Marsh, 2008) and Australia (e.g., Turner, 2009) also were surfacing. Similarly, research was being conducted in Canada (e.g., McTavish, 2010), Latin America (e.g., Kim, 2009), and India (e.g., Mitra, 2003).

Also unlike Lankshear and Knobel (2003b), the 2002-2010 literature review conducted for this current study found that more than one study positioned itself within the 'Discursive Prowess' and 'Multi-modality' ends of the classification continua. Indeed, the current review found a total of 13 new studies falling into this category. All 13 of these studies explored the multimodality and the multiplicity of literacies and/or involved the research that focused on "learners acquiring competence with authentic forms of informed meaning making among experts within contexts of participation in 'mature' versions of social practices" (p. 73). Scholars had indeed begun to respond to Lankshear and Knobel's 2003 call for further research into the social purposes of new technologies in early childhood research.

The remainder of this segment of the literature review into young children's use of new technologies will focus on these 13 studies. There was a threefold rationale for this focus. First, according to McTavish (2010, p. 44), up until 2003 early childhood literacy research had not yet begun to investigate the social purposes of new ICTs in any great detail. Second, due to the rapid change in the types of new ICTs and the associated changes in literacy and learning (The New Literacies Research Team, 2007), studies conducted earlier than 2002 can be deemed to be less representative of young

children's ICT-mediated experiences today. Third, it was reasoned that children older than 8-years-of-age have different learning and literacy needs and competencies than 5-year-olds.

Of the 13 studies exploring the sociocultural dynamics of technology-mediated literacy learning, five either investigated out-of-school contexts and/or home-based interactions between young children and their family members. These studies will not be reviewed here but they will be reviewed with the out-of-school literature (section 2.3.2) and the literature investigating the influence of family members and peers (section 2.3.3).

Of the remaining eight studies, Hyun and Davis (2005) analyzed the dialogue between kindergartners participating in technology-oriented map-making learning activities in a technology-rich classroom environment. Hyun and Davis noted that as the children became more comfortable with the new ICTs, their dialogue became more collaborative and "cumulative talk patterns among the children evolved into exploratory talk" (p. 118). The researchers argued that "this exploratory talk may be evidence of the children's extending the knowledge, skills, and concepts they process and control, especially within the context of ZPD with 'matured others'" (p. 125). Pointing out data supporting the benefits of having more ICT-capable peers and teachers in the classroom, Hyun and Davis concluded that "collaborative dialogue between learners and teachers helped scaffold [less capable students'] knowledge of how to function in a technology-rich learning environment" (p. 132).

Hill (2004) and Ranker (2006) both observed young children using 'offline' computer programs and found that children bring a wealth of sophisticated out-of-school experience using new technologies, and new literacies, that can be integrated into the classroom. For example, Ranker noted (2006) that when an 8-year-old student in his

case study was encouraged to express specialized knowledge about a semiotic domain not usually valued in the classroom (in this case video gaming), and was encouraged to express this knowledge using communication technologies and modalities of their choice, the student: (a) communicated using a preferred communication modality of drawing; (b) became more engaged in the learning activity than if they tried to express themselves through the teacher's traditional literary text-based concept of, for example, plot and character development; and (c) was able to encourage the teacher to rethink and reshape the teacher's "text values in which [he] had come to invest and emphasize over the years as an elementary teacher" (p. 84).

Lotherington and Chow (2006) explored the effect of using Hyperstudio in a writing activity with 7- and 8-year-olds, and Merchant (2009) researched how traditional literacy practices were recontextualized when seven- to 11-year-old children participated in an immersive and literacy-rich online 3-D experience. Both studies noted that when students were encouraged to use new ICTs in their learning activities and presentations, students demonstrated an eagerness to explore and use the software's multimodal communicative abilities, and they incorporated (or wanted to incorporate) many of their out-of-school cultural artifacts and experiences into their understandings, communications and presentations.

Merchant also noted that parental concerns and the school culture constrained the types of experiences and the forms of communication that could be built into a school-based 3-D learning world. Students expected experiences similar to that contained in their own out-of-school virtual worlds, however, parental and teacher concerns about bullying and the promotion of incorrect spelling and informal interactive written discourse, ensured the school-based virtual world did not parallel that experienced by students in out-of-school settings.

In short, both of these studies emphasized that the use of new technologies based in a pedagogy of new multiliteracies (New London Group, 1996) encouraged: (a) young children to bring their cultural experiences into the classroom; (b) communication in general and, (c) communication that could oppose that valued by the school's culture (Merchant, 2009).

Using interview and observational field note data collection methods, Mouza (2005) and a team of teacher-researchers examined the integration of new technologies into the classrooms of six U.S. kindergarten to grade two classrooms. The team noted that the use of technology in learning activities increased student confidence and self-efficacy (they were able to produce polished written works), increased student motivation to engage in learning activities, and enhanced learning in academic areas such as literacy, mathematics, and social studies. Furthermore, researchers noted that a great deal more spontaneous peer sharing and teaching occurred around the computers as children tried to help each other solve learning challenges.

Finally, Cassell (2004) examined research investigating the use of four *textless* Story Listening Systems (SLS) with 6- to 11-year-olds. She found that children responded enthusiastically to the SLS design, noting that their response was likely due to SLS fostering a social context of peer to peer collaboration (i.e., communications and interactions that were playful, spontaneous, personally meaningful, and emphasized making oneself understood) rather than expert to novice collaboration (p. 102). From her reviews of research she also synthesized four key learning principles fundamental to SLS and their emphasis on situating learning in a sociocultural context.

### **2.3.1b ICT-mediated learning research**

One of the earliest and foremost experts theorizing how technology can create new paths of knowing and learning is Seymour Papert. Building on constructivist

learning theory proposed by Piaget (1929/2007), Papert outlined a theory/method of learning called constructionism (Papert, 1980; Papert & Harel, 1991) which proposed learning to be a process of reconstruction rather than a transmission of knowledge. Papert argued that humans used mental constructions (constructivisms) as an effective method for getting physical constructions (constructionisms) built (Guzdial, 1997). Thus like Piaget, learning and the construction of knowledge and understandings were to be emphasized as a private affair of the individual occurring largely within the individual's mind.

In 1967, Papert assisted in designing a programming language called Logo through which he researched and demonstrated how technology can be used to help young children make their own deductions, solve problems, and come to their own understandings about complex concepts through meaningful creative experimentation and the construction and sharing of objects (Papert, 1980). Teaching for Papert was (and still is) viewed as a mediating role where the teacher, or 'more competent other', does not 'teach at' students but assists students to come to individual and collaborative understandings through hands-on learning activities.

More recently, Gee (2009a, 2009b) proposed a technology-mediated learning theory that at first glance seems similar to the constructionism theorized by Papert. For example, Gee proposed that human learning involved individuals organizing experiences in their memory, and that individuals used these memorized experiences to "run simulations in their minds to prepare for problem solving in new situations. These simulations help them form hypotheses about how to proceed in the new situation based on past experiences" (p. 43).

Moreover, drawing upon constructivist learning theory by Kolodner, Cox and Conzález-Calero (2006) and research by Glenberg Gutierrez, Levin, Japuntich, and

Kaschak (2004), and Gee (2009b) further argued that there are five conditions that must be met in order to make these memorized experiences useful for learning. First, these experiences must be structured by specific goals. Second, experiences must be interpreted (i.e., one must analyze how goals relate to a situation, understand lessons learned, and anticipate when and where lessons are useful). Third, feedback from experiences must be received immediately so assessment and correction of errors can be made quickly. Fourth, learners must have abundant opportunities to apply interpreted experiences so they can make generalizations. And fifth,

learners need to learn from the interpreted experiences and explanations of other people, including both peers and experts. Social interaction, discussion, and sharing with peers, as well as mentoring from more advanced others, are important. Debriefing—that is, talking about why and how things worked in the accomplishment of goals—after an experience is important. Mentoring is best done through dialogue, modeling, worked examples, and certain forms of overt instruction, often “just-in-time” (when the learner can use it) or “on demand” (when the learner is ready). (p. 44)

It is with an emphasis on this last point that Gee distances his learning theory from Papert’s. Gee proposes a sociocultural theory of ICT-mediated learning that stresses the key role situated social interactions play in learning. That is, it is through an individual’s experiential participation and/or apprenticeship in social groups that the individual develops a “social identity” and acquires a large majority of the aforementioned five elements indicative of effective learning (e.g., goals, interpretations, practice, explanations, debriefing, and feedback). Gee concludes that “good learning requires participation – however vicarious – in some social group that helps learners understand and make sense of their experiences in certain ways” (p. 46). Gee also

argues that it is through the experience of social interactions (mentoring, sharing, debriefing) that learning becomes situated, learners become goal driven, and learning identities become focused (p. 50).

Current sociocultural case study research by Plowman, Stephen, and McPake (2008), investigated the role of guided interaction and an apprenticeship approach to learning and teaching similar to that proposed by Gee. In this case, the researchers investigated the different roles that adult mentors took in play-based and ICT-mediated learning activities situated in the homes and preschool settings of eight daycare groups of Scottish three to 5-year-olds. Upon comparison of their observations, it became evident that the guided interactions adults were providing children at home were far more frequent and diverse than those occurring at school. This directed researchers to conclude, "Our findings suggest that current preschool and primary staff have limited knowledge of children's home experiences with technology and that they are therefore not in a position to optimize this learning. Moreover, the kinds of ICT-related skills which primary school teachers choose to develop in their pupils have little in common with the competences that children develop at home" (p. 28). These findings also parallel McTavish's (2010) research which found family members and peers of grade two children exposed the children to far greater and more diverse set of information literacy skills, and literacy skills, than those taught at school.

Current studies into young children's ICT-mediated learning also investigated children's interactions with the Internet. For example, Spink, Danby, Mallan and Butler (2010) explored the abilities of 5-year-old children to engage in complex web searches. They noted that when children worked on their own, most quickly became frustrated with spelling search words. However, when "the teachers stimulated the children by asking questions, explaining the text and scaffolding their understanding of Websites and the

Internet in general...the teachers did encourage the students to engage in a higher level with the Website than the student would do independently” (p. 18). Researchers also found that when teachers were not present in the room, children automatically became louder, more animated, and automatically began to work collaboratively with each other on figuring out their Web search tasks (p. 16).

Since 1999, researchers also have explored the effects that free access to computers would have if introduced to a community that had little or no experience with computers, and were provided very little opportunity to have their learning scaffolded by more competent others or mentors (Dangwal & Kapur, 2009; Mitra, 2003; Mitra, Dangwal & Thadani, 2008; Mitra & Rana, 1999, 2001). Called ‘the hole in the wall’ experiments, the researcher’s mounted and bolted Internet–capable computers in holes they carved in the walls of buildings located in a wide variety of socioeconomic, cultural, and physical locations in India. In most cases, these hole-in-the-wall computers were located in communities that could not afford a computer and where most people had never used or even seen a computer before. Then offering little or no guidance to community members, the researchers gave the community free and open access to the hole-in-the-wall computers and then stood off to the side and recorded observations describing how community approached, accessed and used this new technology.

Regardless of which urban centre these hole-in-the-wall computers were located, researchers found that: (a) young children often initiated explorations with these new ICTs; (b) children used trial and error to very quickly self teach themselves, and each other, the hardware and software skills required to operate the computer and browse the Internet (in one case, a small group of children self-taught themselves to surf the Internet within 8 minutes); (c) children browsed the Internet without knowing English; (d) non-English speaking children quickly self-taught themselves 200 or so English words

required to browse the Internet (such as exit, next, stop, open, and file); (e) some children were using the Internet to learn English so that they could comprehend more English while browsing; (f) younger children were often seen teaching the older ones how to use the computer; and (g) if tested after having just learned to use the computer, groups of children looking on would come to know as much about how to use the computer or the content they were browsing as the one child using the mouse and keyboard to guide the group's explorations. Mitra (2007) concluded that as long as 6- to 13-year-old children worked together in groups when learning to use a hole-in-the-wall computer, they would organize their learning and instruct each other irrespective of anything that the researchers could measure (e.g., socioeconomic status, I.Q., age, gender, and so on).

Using findings from their research investigating how young children interact with new ICTs to independently learn how to read and successfully navigate microworld programs, Shade and Watson (1990) and Sluis et al. (2004) would argue that auditory, visual and multimodal feedback and prompts on most computer systems and well designed learning software could, and likely did, partially fulfill the role of a more competent other in the hole-in-the-wall research. However, in a literature review of the research and commentaries investigating the digital information literacy practices of the Google generation (children and young adults born since 1993), Rowlands, et al. (2008) argued that today's young adult information literacy skills are far less developed than is assumed, that professionals "overestimate the impact of ICTs on the young, and that the ubiquitous presence of technology in their lives has not resulted in improved information retrieval, information seeking or evaluation skills" (p. 308).

Finally, there is a slowly growing body of research relevant to this study that explores multimodal instruction and learning. According to Jewitt (2008), the study of multimodality is like multiliteracies in that it

has emerged in response to the changing social and semiotic landscape. Key to multimodal perspectives on literacy is the basic assumption that meanings are made (as well as distributed, interpreted, and remade) through many representation and communicational resources, of which language is but one”.

(p. 246)

The concept of multimodality is an extension of Halliday’s (1978, 1985) social semiotic theory. The main tenet of Halliday’s theory is that human communication (language) develops from the ‘work’ of human social and cultural meaning-making interactions. It is through this ‘work’ that humans shape resources (e.g., paper and pencil) to meet their material, social and cultural needs (e.g., writing to enable non-face-to-face communication and facilitate the recall of information). According to Jewitt (2006) a theory of multimodality proposes that, like language, all modes of communication and meaning-making (e.g., music, speech, sound, action, and visual communication) are shaped in a similar fashion. For example, music is created to, among many things, help communicate ideas, emotions, knowledge and concepts. Furthermore, Jewitt notes that “multimodal theory has also focused on the ways in which modes are combined and designed to make meaning” (pp. 3-4). Current multimodal research largely explores the advantages that multiple modes of instruction (written, visual, gesture, aural, linguistic, tactile, and combinations of these modes) may, or may not, afford the learner.

Among the three studies specifically investigating the multimodality of young children (Flewitt, 2006; Pahl, 1999; Wolfe & Flewitt, 2010), Pahl (1999) observed the literacy activities of a group of 4-year-old British preschool children. She concluded that

preschoolers were constantly, naturally, and actively engaged in many different meaning making activities through the day, and that they were quite adept at expressing themselves through different modes of communication including drawing, painting, modeling, speaking, and play. For example, children were observed deeply engaged in cutting out caterpillars and fish and animating them in the process of visualizing and acting out stories they created from their imaginations.

Pahl (1999) also noted that the boys in this group were especially motivated to 'discover narrative' and engage in much more complex narrative writing when their stories were first grounded in multimodal forms of expression, especially drawings, models and drama activities. She concluded that all children were observed to connect with content more deeply, and engage more actively in their learning, if they were allowed and/or encouraged to communicate, connect ideas, and make meaning using familiar modes, and when children were encouraged to transpose across multiple modes (e.g., children were much more attentive to writing a story if they were allowed to simultaneously recount it orally and reflect upon associated visual models).

Flewitt (2006) used interviews, audio recordings, and videotape to track and describe how preschoolers made and expressed meaning both in their homes and their daycares. Similar to findings by Pahl, Flewitt found that children brought and employed a full range of multimodal approaches to their learning. However, she also found that: (a) children simultaneously employed interwoven modes of communication (e.g., speech, gaze, and movement) rather than sequentially separate elements of discursive practice; and (b) the modes children used at home and daycare were shaped by their unconscious grasping of patterned behaviours corresponding to each context's particular social structures, routines, activity types, and interpersonal relationships.

Wolfe and Flewitt (2010) observed taped interactions of a mother teaching her twin preschoolers to assemble a jigsaw puzzle, and of the twins playing an online visual-matching game. In both cases the researchers noted how the three negotiated meaning through multimodal forms of communication including gaze, language, and gesture, and movement. More relevant to this study was the finding that the twins used a great deal of visual feedback from the computer screen (the computer's sound was turned off) to teach themselves how to play a memorization game. After two weeks Wolfe and Flewitt concluded that the twins "appeared to have developed the clear ability to read and respond to graphic images" and "had acquired some level of ability to read or decode the signs and symbols on screen and understand how they interrelated to produce meaning" (p. 96).

Although Wolfe and Flewitt's findings did highlight the role that four modes of communication play in these twins ICT-mediated learning, it was not their focus to investigate the variety of modes that the twins accessed at home when using and learning to use new ICTs. For example, in Wolfe and Flewitt's study the twins' computer speakers were turned off thus eliminating the opportunity to investigate the potential role that computer generated sound (including music) could have on their learning. Additionally, Wolfe and Flewitt did not discuss in any depth the role that physical interactions had on the girls' meaning making practices. Nor did they discuss the level to which other modes of communication (e.g., speech and gestures) were affected (if at all) by the twins gazing at the computer screen.

Aside from Wolfe and Flewitt's study, no research has been conducted that specifically identifies the modes of communication and meaning making practices of kindergarten children while using new ICTs in the home. As a result it is not clearly known which modes 5-year-old children employ while using and learning to use new

ICTs, and if or how the patterns of teaching or learning differ to that of current learning and literacy theories. One of the goals of this research is to identify and describe more clearly the multiple modes of communication used while participants are using and learning to use new ICTs.

Finally, educational scholars raised concerns about the negative role new ICTs may play in children's physical and mental development. For example, Granich, Rosenberg, Knuiman and Timpero (2010), reviewed the existing body of research on child obesity and noted that western children's average weights are rising alongside their increased use of screen-based technologies. On the other hand, Kupfer (1995), Stoeltje (1996) noted that one possible result associated with encouraging children to spend too much time using new ICTs may be the development of introverted and isolated learners. Healy (1999, 2004) concurs, citing cognitive research that found young children's increased use of new ICTs correlated with children spending significantly less time engaged in developmentally appropriate 'basic activities' (like imaginative play, being physically active and reading). Additionally, Healy charges that parents, and society in general, are using new ICTs as surrogate babysitters, resulting in children sitting mentally unchallenged and physically inactive in front of televisions and screen-based new ICTs for long periods of time. Moreover, she argues that this inactivity compromises a child's mental development, and reduces their ability to take command of language, sustain engaging thought, and develop the ability to conduct rigorous mental analysis and synthesis (p. 346).

However, it is also important to note that 10 years have passed since Healy published her study. In that time, the number and types of computer software and hardware has multiplied and changed drastically. Indeed, one could argue that the software and hardware existing at the time of Healy's study was vastly more limited far

less interactive and intellectually stimulating than that used by children today, and that her concerns were quite founded. On the other hand it is also just as important to conduct new research to determine if her concerns are still valid today.

### **2.3.1c Summary**

There has been a slow but measured increase in the number of studies investigating children's ICT-mediated literacy development over the past eight years. Many of these studies focused on skill-based reading and writing and did not explore the sociocultural roles that ICT-mediated literacy development may enable or discourage. This study has the potential to begin filling this knowledge gap.

Although there was some research investigating children's use of multimodal forms of communication in the classroom, only one of these studies (Wolfe and Flewitt, 2010) investigated the types of multimodal learning 5-year-olds were engaging with at home while using new ICTs and how this learning was enhanced or limited by these modes of communication. Conclusions from this study may corroborate or refute Wolfe and Flewitt's findings regarding the multimodality of young children's communication and meaning making practices when using and learning to use new ICTs. It also will also create new spaces for comparative discussions between findings from two very different contexts, home and school.

### **2.3.2 *Out-of-school literacy and learning research***

Often referred to as 'informal learning research', out-of-school literacy and learning has multiple definitions. According to Sefton-Greene (2006, pp 4-5), these definitions can range from "literacy and learning investigations that occur outside the physical walls and time slots of school", to "learning and literacy development that occurs unconsciously in every day life and thus does not follow a formalized organized curriculum". Furthermore, out-of-school research is often conceptualized as the opposite

of school-based research. However, Hull and Schulz (2001, p. 577) note that such arbitrarily defined dichotomies ignore the overlap between the two domains and the possibility of recognizing school-based practices occurring in the home and, home based practices occurring in the school.

For this review, any research that investigated learning either minimally tied, or not tied at all, to a formal curriculum organization, whether it occurred within the school's walls or not, was considered for this review. Moreover, an emphasis was placed on reviewing out-of-school research that explored the role that culture, social context and identity played in a young child's learning and literacy development, and which occurred within home and daycare contexts similar to those described in this study.

The roots of out-of-school learning and literacy studies can be traced back to community and scholarly concerns that arose in the 1960's and 1970's over the inability of students from ethnic or low socioeconomic backgrounds to excel in school (e.g., Hymes, 1964). One of the key out-of school research studies to develop from these concerns was conducted by Heath (1983). From 1969 to 1978, Heath gathered ethnographic data that detailed the very different enculturation and language patterns (such as reading and writing) of two distinct working-class communities, Trackton and Roadville. She then followed the children from these two communities as they entered school and struggled, or failed, to learn a third set of mainstream, or Townspeople's, cultural and linguistic values and patterns.

She continued her work by teaching the Townspeople educators metalevel language and cultural awareness strategies that helped them acknowledge and link students' home culture, language, and learning with that valued in school. The results were encouraging as students experienced a greater agency in their own learning, students' backgrounds were brought in closer touch with the school's (and vice versa),

and students experienced more school success (Heath, 1983, pp. 354-369). The strengths of Heath's work were it: (a) confirmed the multiplicity of students' out-of-school cultural and linguistic backgrounds; (b) emphasized the central role educators played in marginalizing students with cultural and linguistic backgrounds different than that valued in school; and (c) provided evidence that teachers and students could be taught to rethink their literacy practices in the classroom and construct "curricula from the world of the home to enable students to move to the curricular content of the school" (p. 340).

Another key researcher concerned with documenting the social purposes of out-of-school literacies is NLS researcher Brian Street. Street (1984) examined the different literacy practices used by children and adults in three different contexts in an Iranian community. Comparing the literacy practices used in marketplaces, mosques, and British schools, Street noted that the social practices, texts, and concepts were different for each context, yet the members of each community also regarded these differences as being meaningful in helping them fulfill practices tied to reading, writing, speaking and listening in that community. Aside from researching children's literacy practices alongside those of adults, Street's study is noteworthy because he explains the development of in- and out-of-school literacies in light of the relative power and opportunities each offered the community of users, and how each literacy was shaped by social, cultural, historical, and political contexts.

Gee (2003) also conducted retrospective research into the educational potential that his own and children's engagement with video games played in out of school contexts. Positioning his exploration in learning and literacy theories on situated cognition (e.g. Bransford, Brown, & Cocking, 1999), New Literacy Studies (e.g., New London Group, 1996; Gee, 2008b), and connectionism (e.g., Clark, 1993), Gee proposes that human learning and literacy development are largely shaped by the

Table 1

*Gee's (2003) 36 Learning Principles*


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1) Active, Critical Learning	19) Intertextual
2) Design	20) Multimodal
3) Semiotic	21) "Material Intelligence"
4) Semiotic Domains	22) Intuitive Knowledge
5) Meta-level thinking about Semiotic Domain	23) Subset
6) "Psychosocial Moratorium"	24) Incremental
7) Committed Learning	25) Concentrated Sample
8) Identity	26) Bottom-up Basic Skills
9) Self-Knowledge	27) Explicit Information On-Demand and Just-in-Time
10) Amplification of Input	28) Discovery
11) Achievement	29) Transfer
12) Practice	30) Cultural Models about the World
13. Ongoing Learning	31) Cultural Models about Learning
14) "Regime of Competence"	32) Cultural Models about Semiotic Domains
15) Probing	33) Distributed
16) Multiple Routes	34) Dispersed
17) Situated Meaning	35) Affinity Group
18) Text	36) Insider

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beliefs, values, cultural models, and meaning-making communication activities particular to the semiotic domains (or discourse groups) to which one subscribes. His arguments are convincing and compelling, as is the list of 36 learning principles he believes are characteristic of effective computer games. Gee (2009b) also argues that these 36 learning principles (see Table 1) are indicative of effective learning environments and should be the impetus behind future school reform.

Unfortunately, Gee's very limited sample in this study, and lack of rigour in his research design limits the credibility, authenticity, and reliability of his research, and his focus on understanding the principles of learning and teaching associated with the design of the computer software itself, provided only limited insights into the social dimension of the literacy and learning practices of primary-aged children while using new ICTs. This study seeks to fill this knowledge gap through the application of credible, reliable, and authentic research methodologies, and by focussing in on the social dimension of young children's (and their family members' and friends') practices and principles of learning and teaching while using new ICTs.

Current research into young children's out of school learning and literacy practices continues to emphasize the need for educators to acknowledge the diverse learning and literacy practices children develop out-of-school and the need to engage these diverse ways of knowing in classroom learning activities and instruction. For example, Turner (2009) examined the relationship between the observed out-of-school literacy practices of three kindergarten classes in Sydney, Australia, with the state's school policies and curriculum. She found that even though children developed an impressive array of technology skills, media skills and multiple literacies, these were largely ignored in school because school literacy programs and assessment valued only traditional print and paper-based reading and writing skills.

Studies by Dyson (2001a; 2001b; 2003; 2008), Hill (2004), Sze, Chapman & Shi (2009), and Wollman-Bonilla (2003) have explored different aspects of children's writing and noted the impact out-of-school cultural and literacy practices had on a child's writing. Dyson noted how children drew experiences from their playground and home experiences and incorporated these experiences into their writing. Hill noted that when young children were encouraged to use new ICTs to redesign a fairy tale in an open ended manner, they chose to do so with a surprising number of pop culture images and multi modal forms of communication. And Wollman-Bonilla (2003, p. 81) noted that her 6-year-old daughter developed a diverse set of genre writing conventions that differed from socially valued aspects of traditional school-based writing.

Finally, Marsh (2008; 2010) and Turvey (2006) investigated the online peer networking and game playing practices of young children. Turvey found that young children's online social activities were shaped by, and thus mirrored, their offline social activities (and vice versa). Similarly, Marsh (2008) noted that the characteristics of children's online play closely paralleled the play children enjoyed offline (e.g., the virtual worlds provided a variety of types of play, encouraged identity forming, allowed some creativity, and emphasized socially interactive play with others). Marsh also argued that children view online play as real, thus explaining why many of the playful online social learning behaviours witnessed between children were similar to those witnessed offline. However, Turvey also noted that although there were some instances of 'deep learning' (Askew & Carnell, 1998) naturally occurring in children's informal out of school online networking practices, such communities still required a "teacher within and outside the virtual community...to make the most of affordances and opportunities offered by online communities" (p. 320).

Research into out-of-school literacy and learning has been said to have “played pivotal roles in the history and development of literacy research and literacy theory” (Hull & Schultz, 2001, p. 576). It is the intent of this research to develop principles of teaching and learning from participants’ practices and behaviours while attempting to look beyond school-home dichotomies and to explore the possibility that there may be more overlap and sharing between the social practices, texts, and concepts of home and school (and other communities of practice) than may be currently thought to exist.

Another finding common to the major corpus of out-of-school literacy and learning research is that children developed a rich array of literacy and learning practices paralleling the social and cultural experiences they live and enact on a daily basis. Powerful learning and literacy potentials can be realized by building upon students’ out-of-school literacies.

Little is known about the rich array of specific ICT mediated literacy and learning practices that 5-year-old children develop while using new ICTs. Research by Hill (2004), Marsh (2008, 2010), McTavish (2010), and Turner (2009) has begun to generate data for this age group. Nevertheless, they do not identify core principles of teaching and learning based on social interactions within the home, nor do they generate data detailing who or what is responsible for teaching these children how to use new ICTs in the home.

### ***2.3.3 Research investigating the influence of family members and peers***

The following section reviews the literature investigating the significant role family members and peers play in a child’s literacy development and learning capabilities when using new ICTs.

### **2.3.3a Family Members**

The empirical research exploring the important roles family members play in a young child's social and emotional development and acquisition of traditional print-based literacy is extensive and insightful (e.g., Durkin, 1966; Heath, 1983; and Taylor, 1983). Arguably one of the most noteworthy studies to emphasize the role parents play in a young child's print-based literacy development was conducted by Durkin (1966) in which she found the most significant factor predicting a young child's reading success (and success in school in general) was associated with parents reading literature out loud at home to their children (now called shared reading).

In addition, Taylor (1983) drew attention to how family members of six families drew upon distinct sociocultural practices and values when transmitting and developing their children's literacy. Similarly, Heath (1983) found that even when parents within a community helped their children develop sophisticated literacy practices (e.g., 'Trackton' children were taught to create complicated narratives and discourse patterns that included singing and rhyming), if these practices were not valued in school, the children's academic success would be limited.

Although there is a great deal of research investigating the important role parents play in the development of young children's print-based literacy, and there is a great deal of statistical research outlining children's and parents' access and uptake of new ICTs (e.g., Lenhart, Purcell, Marsh, et al., 2005; Rideout, Foehr & Roberts, 2010; Smith & Zickuh, 2010), there is far less research investigating the parent's role in helping their young child learn to use new ICTs and/or develop traditional or new literacies while using new ICTs (Barkin, 2006; Morison & Krugman, 2010). According to Downes, Arthur and Beecher (2001), this lack of research may be due to perceptions that "children do not have the fine motor, cognitive, or language and literacy development to successfully

engage in computer experiences” (p. 140).

However, the research that does exist can be grouped into two categories: mediating research and mentoring research. Mediating research explored the roles parents played in helping children: avoid exposure to violent or antisocial screen-based content, or constructively and critically process and question the violence so as to minimize the child’s violent behaviours. On the other hand, mentoring research explored the mentoring, scaffolding, and instructional roles parents employed when helping their child learn to use new ICTs.

Although mediating research does demonstrate the important effect parenting communication styles can have on mitigating the effect of violent screen-based content, this body of research provided limited insights into the contexts, conditions, and or the principles of learning and teaching responsible for allowing children’s learning to flourish when using new ICTs.

Modelling research explores the instructional roles parents played in helping children learn to use new ICTs. The study most pertinent to this research was conducted by Plowman et al. (2008). In a two stage investigation, these researchers first interviewed family members of 346 families containing at least one child between the ages of 3 and 5 and found that all but two of the children were accessing multiple types of new ICTs and becoming proficient using these regardless of their parents’ socio-economic status or the technological abilities of the child’s parents, or other family members. In the second stage of their study, Plowman et al. (2008) randomly selected 24 students to participate in case studies. These case studies examined the family’s interactions using new ICTs in the home that involved 3- to 5-year-old children. They found that,

A wide variety of people were supporting learning in the home, sometimes simply

by being engaged in their own activities. They included children, such as older siblings and cousins, as well as parents, grandparents, other relatives and family friends. (p. 11)

Findings also indicated that parents played an important role in helping their young children learn to use more traditional home-based technologies such as DVD/video players, televisions, and associated remote controls. Furthermore, half the parents reported being instrumental in teaching the child how to set up and start up the family computer, access websites, view cell phone photos, and take pictures with a digital camera (p. 11).

One of the key findings from this study was that parents reported they did not overtly or consciously set out to teach children how to use new ICTs. They believed their children either taught themselves (including by trial and error), copied what others were doing, or learned from other people's demonstrations. However, analysis of video and observational field notes indicated that parents did give direct instruction to their children, and that parents "used limited explicit tutoring [and] they were also unknowingly demonstrating uses of technology on a day-to-day basis such that children were believed to "just pick it up" (p. 12).

Within the body of modeling research, a segment of studies explored the roles parents play in their children's uptake and use of the Internet. Grossbart, McConnell, Pryor, and Yost (2002) explored the social interactions of 18 children (ages ranging from 7- to 17-years-old) and their parents while using the Internet. Findings revealed that parents with "warm parenting styles" – parents who had "an accepting orientation, child centeredness, and use of explanation and reasoning" (p. 67), were more likely to encourage their child to conduct online 'language brokering' and 'Internet brokering'. In other words, children who felt at ease with their parents were more likely to take the time

and energy to explain and demonstrate to their parents both the use of appropriate language and surfing strategies specific to the Internet domain being used/explored, and the specific Internet navigating, shopping, trading, selling and consumerism protocols.

There are two key findings from the research undertaken by Grossbart et al. (2002) pertinent to this study. First, learning between parents and children is a social activity that involves varying degrees of reciprocity (both child and parent collaboratively help each other be better users of the Internet by quickly oscillating between their mentor and mentee roles). Second, learning that involves such reciprocal 'brokering' occurs between parents exhibiting warm personalities, whether the parents perceive themselves as an accomplished Internet user or not.

Researchers also have investigated the roles siblings play in a child's literacy development (Gregory, 2001, 2004; Lenhart & Roskos, 2003; Volk & De Acosta, 2001; Williams & Gregory, 2001), and the role siblings play in helping children learn to use new ICTs (Downes, 2002a, 2002b; Vryzas & Tsitouridou, 2002). Although far less researched, studies have also explored the role siblings play in a young child's computer mediated literacy development (Kenner, Ruby, Jessel, & Gregory, 2008).

Siblings, especially older siblings, provided models for younger children's learning and literacy development. For example, Gregory (2004) and Mui and Anderson (2008) noted that older siblings often mentored their younger siblings in learning school-based literacy practices. Lenhart and Roskos (2003) found that older siblings spend more time than parents with the younger children and were responsible for modeling a wide variety of traditional literacy practices that "pave[d] the way for brave reading and writing attempts that the younger siblings might not otherwise try" (p. 98).

However, Gregory (2001) also found that the form of instruction was less a form of scaffolded mediation controlled by the older sibling, and more of a personal, informal,

synergetic two-way negotiation of learning. Gregory (2001) explains this synergy as “a unique reciprocity whereby siblings act as adjuvants in each other’s learning” (p. 309), and that,

Unlike the unidirectional implications of ‘scaffolding’, where caregivers or teachers have a superior knowledge, status and authority, our study reveals how siblings are able to play out their anxieties and practice newly acquired knowledge on an equal footing. Unlike ‘collaborative learning’ between peers at school (or even outside school) older siblings often share a personal ‘sense’ of words, activities and practices that are important in their everyday lives. Thus older siblings act as cognitive facilitators and younger siblings act as prompters as they play together. (p. 319)

Similarly, Volk (1999) found that older Latino siblings relied on blending or *syncretizing* their teacher’s and parent’s teaching styles and cultural meaning making practices, (along with teaching styles experienced in previous years and with different cultural groups) when mentoring their younger sibling in learning to develop school-like literacy and learning practices (pp. 8-9).

The second common thread in the sibling studies was that learning and literacy development frequently occurred between siblings through informal interactions and play. For example, Williams and Gregory (2001) found that it was through imaginative play (e.g., ‘playing school’) that older siblings from two different cultures were able to mediate and teach the ‘school’s’ discourses values and practices to their younger siblings. Volk (1999) and Volk and De Acosta (2001) researched the instructional strategies of older Latino siblings and found that whether or not their parents engaged in more formal classroom-style teaching or not, “the siblings provided opportunities for learning that were imbedded in play and other meaningful interactions” (Volk, 1999, p.

29).

### **2.3.3b Peers**

The influence young peers have on each other is also another well documented aspect of learning and literacy development. Young peers, for example, have been found to use language in social interactions to drive one another along in clarifying communicative intentions (Goncu, 1993), in helping each other modify, expand, refine and intricate their storytelling skills (Preece, 1992), and in scaffolding and motivating each other's writing on a computer (Butler & Cox, 1992). Scholars propose that it is through grappling with each other's differing perspectives (Pellegrini, Galda, & Rubin, 1984) and comparing and contrasting each other's actions (Rogoff, 1990), that peers begin to modify and learn, usually unconsciously, new or different actions and understandings.

However, researchers have also noted that young peers can, and do, consciously and directly instruct and assist each other in each other's literacy development. For example, Stone and Christie (1996) found that both same age peers and younger and older peers consciously modeled, tutored, directed, negotiated, affirmed, and contradicted each other when engaging in literacy rich activities. Additionally, Verba (1998) found that preschoolers automatically and naturally tutored less knowledgeable children in problem solving situations where the children's knowledge and experience were much different. Furthermore, research indicates that peer collaboration and peer tutoring programs have positive effects on student's academic, social, emotional and physical capabilities (Ayers, 2009; Greenwood, Delquadri, & Hall, 1989; Wright & Cleary, 2006; Yaoying, Gelfer, Sileo, Filler & Perkins, 2008).

Current research investigating the roles peers play in each other's ICT-mediated

learning and literacy development has largely focused on interactions in the classroom context. Research repeatedly confirmed the role that more capable peers (and adults) played in a young child's literacy development and their ability to acquire the skills necessary to use new ICTs. For example, Hyun (2005) and Hyun and Davis (2005) researched the emerging inquiries and ICT usage patterns of 18 pairs of 5- and 6-year-olds in a technologically-rich classroom environment and found these children could "develop technology skills at a far more rapid pace in a technology-rich setting than they would in a typical classroom" (p. 78). However, they noted that this quick uptake was facilitated not only by the presence of readily accessible new ICTs in the classroom, but more importantly by the teacher's emphasis on collaborative peer work in which children were encouraged to "perform ordinary tasks independently and more complex tasks in collaboration with more capable peers or adults" (p. 84).

Similarly, Burnett, Dickson, Myers, and Merchant (2006) found that when two classes of eight to 10-year-olds were encouraged to work in pairs and learn how to email a pair of students at another school, children informally peer-tutored each other in technological skills without being asked. On the other hand, without more capable peers or adults in the classroom dedicated to meeting five- and 6-year-old students' computing needs as they arose, Grieshaber (2010) noted that some students found their computer-based explorations frustrating, inefficient and unproductive. Hyung (2005) found that when children did not have access to peers with more advanced computing skills, students exhibited nonmindful clicking behaviours. Hyung (2005, p. 85) also warned that peers with more capable computing skills need to be paired with peers with even more advanced computing skills, as being constantly paired with peers less capable can "impede and restrain the child's cognitive development". Grieshaber (2010, p. 20) concluded that without access to more capable peers and adults, there

was “no evidence from the data presented here to support ideas that children adapt easily and effortlessly to new technologies (Selwyn, 2001) and that children know intuitively how to use computers (Plowman & Stephen, 2005).”

Finally, Ryokai, Vaucelle and Cassell (2003) found that the more capable peer need not be another human. For example, researchers had 14 pairs of 5-year-old female peers work together with a virtual 5-year-old digital peer named Sam. Sam was an image of a child projected on a screen, had some capability to recognize pauses in children’s speech, was able to converse with children in a rudimentary manner, and was able to model the telling of a story in a developmentally advanced manner. Researchers noted that after listening to Sam tell several stories, both children told stories that more closely resembled their virtual peer’s linguistically advanced story structures.

In summary most studies investigating the peer dynamics of children were conducted in school and concluded that the peer interactions and peer tutoring that were the most successful in advancing a child’s learning and literacy occurred when: (a) one of the peers was more capable; (b) the teacher actively ensured compatible pairings occurred; (c) the students were taught how to work together; and (d) the teacher was close at hand to solve difficulties. In short, these studies helped illustrate Vygotsky’s dialectical constructivist perspective on collaborating with more capable ‘others’ – in this case peers.

### **2.3.3e Summary**

A synthesis of the research investigating the role that family members and peers play in a young child’s development of literacy and learning to use new ICTs, emphasizes that both groups play a large role in shaping a young child’s learning and literacy development. The research also emphasizes that a young child comes to know how to use technology and develop their unique literacy/literacies through a process of

mediation, collaboration, negotiation, scaffolding and play. Moreover, parents, siblings, and peers are often portrayed as acting as mediators and mentors who pass on their and their communities' cultural and linguistic knowledge through informal everyday activities and relationships with young children.

Although some of this research offers detailed information and findings into the teaching and learning that occurs between young children and family members and peers, it does not present the amount of time each member spends with the 5-year-old, what happens while these members are together, and thus who is most responsible for teaching these young children how to use new ICTs and develop the related new literacies. None of these studies focussed on identifying the principles of teaching and learning that occurred in the home on a daily basis, nor did they focus on the social interactions occurring between 5-year-olds and different configurations of their families and friends. This research seeks to begin to fill this information gap.

#### ***2.4 Chapter Summary and Chapter 3 Preview***

This chapter situated this study in the current body of research by presenting a review of: (a) the literature summarizing the theoretical orientations framing this study; (b) the models consulted in the conceptualization of children's literacy and learning practices; and (c) the empirical research related to this study's topic, purpose, and research questions.

Empirical literature reviewed for this study included a very small but growing body of research investigating young children's ICT-mediated learning and literacy research, out of school literacy and learning research, and research investigating the influence of family members and peers.

Gaps in the understandings and knowledge presented by the literature included: (a) more studies need to be conducted in order to understand the specific learning and

literacy needs and behaviours of 5-year-olds ; (b) more studies need to be conducted in Canada (and outside the U.S. in general) to get a clearer picture of the specific learning and literacy needs and behaviours of Canadian students (and the growing global network of children); (c) teaching and learning principles need to be interpreted from observed human social interactions in order to open a conversation and develop models representative of effective learning and teaching in a variety of learning contexts; (d) more research needs to investigate the sociocultural aspects of young children's ICT-mediated learning and literacy development, and most importantly; (e) research studies need to focus on the impact children's use of new ICTs may have on their short and long-term social and cognitive development.

The next chapter, chapter 3, presents the study's methodological assumptions and the methods for data collection, coding and analysis. Strategies for maintaining methodological quality and rigor are discussed and methodological limitations are reported.

## Chapter 3: Methodology

It is not against a body of uninterpreted data, radically thinned descriptions, that we must measure the cogency of our explications, but against the power of the scientific imagination to bring us into touch with the lives of strangers. (Geertz, 1973, p. 16)

### **3.0 Introduction**

In this chapter, the study's methodology and the rationale for employing this methodology, is presented. The three data collection methods, the procedures for recruiting and selecting the study's subjects, and the procedures used to collect, encode, and analyze the data is then discussed. This is followed by an overview of the pilot study and the development of the interview questionnaire. Next, the strategies and structures put in place to maintain methodological quality, rigor, and ethicality are discussed, followed by a report on the known methodological limitations of the study. Finally, chapter 3 is summarized and a preview of chapter 4 is presented.

### **3.1 Research design**

The twofold challenge of this study's research methodology was to: (a) access and generate detailed qualitative data that describes the types, patterns, and principles of new and multiple literacy learning and teaching of meaning-making practices seen naturally occurring within the homes of families whose kindergarten children (5- or 6-year-old children) regularly access and use home-based ICTs; and (b) to analyze and interpret these data in an effort to develop a contextually sensitive critical interpretation of primary children's new and multiple literacies and teaching/learning practices and principles.

In realizing these purposes, a qualitative research methodology was chosen. More specifically, the investigation employed an *interpretivist* ethnographic research methodology that employed qualitative data collection, encoding and analysis methods.

### **3.2 Rationale for the Research Design**

The choice to use a qualitative research methodology in this study is grounded in the three following assumptions about human learning, thinking and activity: (a) individuals construct reality, (b) individual realities are multiple and socially constructed (Mertens, 1998; Rorty, 1980), and (c) realities are constructed within historical and cultural contexts (Avramidis & Smith, 1999; Barton & Hamilton, 2000).

Such assumptions reflect a principally relativist ontology by presupposing the nature of human 'reality' and 'meaning' as being an unique experiential construction for individuals and not an absolute concept found across groups. Furthermore, the assumption that reality and meaning are uniquely constructed by and between individuals reflects a *subjectivist* epistemology that proposes "there is no foundational process by which truth can be determined" (Avramides & Smith, 1999, p. 28). Taken together, these underlying ontological and epistemological beliefs broadly represent an interpretivist philosophy oriented towards understanding the subjective, multiple, layered, and interrelated natures of people's constructions of truth, knowledge and meaning (Barthes, 1989; Derrida, 1978).

Various qualitative methodologies, whose purpose was to contextualize, interpret, and understand the perspectives and meaning of participants and their families in social settings, were considered for this study. This included methodologies of an *abductive* or *inductive* nature where the emphasis is on using 'holistic' forms of data collection and analysis to describe, explain and interpret a range of opinions and understandings indicative of a population (e.g., case study, grounded theory,

phenomenology, hermeneutics, ethnography, and discourse analysis (Blaike, 2000, pp. 100-114).

It was decided to employ an ethnographic research design because this methodology's ontological and etymological assumptions about human learning, thinking and activity, paralleled those underpinning this study. For example, Savage (2000), an experienced ethnographer, characterized most ethnographies as involving, at the very least, participant observation over an extended period of time, and that

Most ethnographers today would agree that the term ethnography can be applied to any small scale research that is carried out in everyday settings; uses several methods; evolves in design through the study; and focuses on the meaning of individuals' actions and explanations rather than their quantification. (p. 1400)

Savage's claim that ethnographies focus on researching "the meaning of individuals' actions and explanations" supports assumptions one and two of this study. Similarly, the statement "small scale research that is carried out in everyday settings" supports assumption three of this study. And the claim, using "several methods [and] evolves in design through the study", suggests that research methods should account for context changing between people and over time, supporting assumptions one, two, and three. In essence, most ethnographic studies are generally founded on relativist ontology and subjectivist epistemology similar to those informing this study.

The strength behind using an ethnographic methodology for this study is not to search, or to re-search, for a truth that is 'out there' 'waiting to be discovered'. Instead its strength lies within the knowledge that 'truths' are uniquely constructed, negotiated, re/evaluated and refined by and between individuals, and that the best way of describing, explaining and interpreting such knowledge about these ongoing processes

is to 'engage' yourself in the community (Mason, 2002, p. 55). Geertz (1994/1973) described this process well when he stated,

The claim to attention of an ethnographic account does not rest on its author's ability to capture primitive facts in faraway places and carry them home like a mask or a carving, but on the degree to which he is able to clarify what goes on in such places, to reduce the puzzlement--what manner of men are these?--to which unfamiliar acts emerging out of unknown backgrounds naturally give rise. (pp. 221-222)

However, because the intent of this research is not only to observe and describe the context, behaviours, beliefs, and perceptions of the kindergarten children and their families while using new home-based ICTs, but also to encourage the integration of data representative of both the subjects' and researcher's interpretations of these behaviours, beliefs, and perceptions, this inquiry specifically embraces an interpretivist ethnography design. Blaike (2000) best describes interpretivist research as follows,

Interpretivists are concerned with understandings about the social world people have produced and which they reproduce through their continuing activities. This everyday reality consists of the meanings and interpretations given by the social actors to their actions, other people's actions, social situations, and natural and humanly created objects. In short, in order to negotiate their way around their world and make sense of it, social actors have to interpret their activities together. (p. 115)

In short, an interpretive ethnographic methodology would: (a) meet the study's first purpose to access and generate detailed descriptions of the community these families represented (Atkinson & Hammersley, 2007; Bowers, 2008; DuFon, 2002); and (b) meet the study's second purpose - to analyze and interpret these descriptions.

### **3.3 Data Collection Methods**

This study utilized four data collection methods: video, semi-structured interviews, video-elicited interviews, and reflective field notes. Video was used to capture visual examples of the natural social interactions of participants and family members as they used new ICTs in their homes. Semi-structured interviews and video-elicited interviews provided subjects opportunities to elaborate, illustrate and reflect upon their usage patterns and values underlying their use of new ICTs. Reflective field notes derived from observing participants using new ICTs in the daycare assisted the researcher to connect theory to the observed behaviours, develop research validity, assemble future interview questions, compile additional descriptive data relevant to the research questions, and construct understandings about the social situations being observed or stated.

The choice to use multiple methods of data collection was predicated in the researcher's desire to emulate the multimodal methods humans employ when trying to make meaning or understand complex processes such as literacy acquisition and learning. Similar to Flewitt's (2006) rationale for employing multiple modes of data collection, it is believed that

Combinations of visual, audio and written data therefore permit multilevel analysis, allowing the researcher literally and metaphorically to 'zoom in' on individual children's uses of different communicative modes with different people, at particular activities in particular moments of time, to 'pan out' by observing the children over time and across different social settings and to explore the relations between these different perspectives. (p. 30)

### 3.3.1 Video

There were five justifications for using video to collect audio-visual data representative of participants' social interactions using new home-based ICTs. First, it allowed the subjects to decide when and what to record so that the video submitted represented what they felt were important examples of their own 'natural' usage patterns of new home-based ICTs (as opposed to a researcher-centered approach to 'taking' video observations). Furthermore, allowing subjects to choose the video that best represented their new home literacy practices supported the interactionist philosophy underpinning this study.

Second, video had the potential to generate the dense, nuanced, 'thick' descriptive data required to understand and interpret the behaviours and perceptions of this study's subjects. This concept of 'thick description' is based on Geertz's (1973) notion that the most effective way of helping readers and viewers to come close to experiencing the 'natural' or 'native' experience, is to provide these 'onlookers' with the textured, layered and nuanced descriptions of the sample and their contexts so that the intentions and meanings of actions and behaviours of the sample can be understood.

Goldman-Segall (1989), a social science researcher specializing in video ethnography, explains how Geertz's 'thick description' applies in video data collection: "In a video environment, thick descriptions are the images/gestures/sequences placed within a contextual setting which convey the meaning of the 'actors' to the 'audience'" (pp. 118-119). In this study, video helped capture many of the subjects' social behaviours (e.g., talk and bodily conduct) and their contextual interactions (manners in which artifacts and ICT factored into the social interactions) which helped 'detail' the recorded descriptions of subjects' behaviours, actions and intentions.

Further to this notion of 'thick descriptions', video afforded a third advantage in providing the ability to record more linguistic information than could field notes alone.

According to ethnographer DuFon (2002),

When taking field notes, the researcher is limited to writing down the gist of what the interlocutors said, or recording only briefly interactions consisting of a few short turns because of constraints on memory and the inherently slower speed of writing as compared with speaking. (p. 44)

Video in this study allowed large quantities of the subjects' words, gestures, and vocal tones to be recorded which in turn added to the thickness of the data collected.

Fourth, the video had a 'permanence' that allowed the subjects and researcher to revisit and replay segments that required more time to contemplate and interpret. Unlike observations done in real time, the ability to return to the video afforded "greater opportunity to explore alternative readings than traditional participant observation, with the researcher able to continually revisit the data records with new lines of inquiry, or in light of new analytical perspectives" (Tutt, 2008, p. 1159). In this study, video allowed both researcher and subjects more time to ponder the recorded events, explore alternate readings, and come to more thoughtful conclusions. This extra contemplation time allowed the researcher more opportunity to form relevant questions for the next interview, and reduced his chances of arriving at hasty conclusions.

Fifth, the permanence of the video also allowed the researcher and subjects to develop validity through the layering of each other's viewpoints into what was being observed and/or heard on the video (Bottorff, 1994). That is, after the researcher viewed the subject's videos, he selected segments of the video that represented interesting, indicative, or confusing communication behaviours and/or statements on the part of the subjects. These segments were then copied onto a laptop and played and replayed

back to the subjects during the interview. Then guided by open ended interview questions, and questions arising from the researcher's interpretations, the subjects provided their own explanations, interpretations, perceptions, knowledge, and understandings about the particular event to the researcher. Subjects' responses were also later transcribed and reviewed by the researcher, and used to create even thicker descriptions, add clarity to the study's findings, and provide what Goldman-Segall (1995) termed, *configurational validity*.

Finally, similar to the justification proposed by Flewitt (2006), the choice to use video, reflected the researcher's belief that focusing exclusively on audio recordings not only creates a false impression of young children as communicatively limited but also fails to portray how children and adults combine communicative modes and how personal and institutional factors impact upon individuals' choices of modes. (p. 29)

In short, video provided the opportunity for participants and their families to have their voices heard, enabled the researcher to clarify his own understandings of the behaviours, actions and intentions of the subjects, and allowed for a compilation of thicker interpretations and understandings of the events being observed and described than could be gained through, for example, interviews alone.

### **3.3.2 Interviews**

Interviews were employed at the very beginning of this study in an effort to gain background information from the parents about the social, cultural, and physical contexts in which the participants were using and learning to use new ICTs. An interactive interview format was selected because it allowed the researcher to negotiate and re/construct this knowledge with and between the parents, the participants, and the researcher himself, and because it placed emphasis on gathering deep, nuanced,

complex and round data, rather than amassing broad surface patterns indicative of, for example, surveys and questionnaires.

### **3.3.3 Semi-structured video-elicited interviews**

Three of the four interviews employed in this study were semi-structured video-elicited interviews. The decision to use video-elicited interviews (also termed video-cued interviews, video prompted interviews, video-reflexive interviews, or *autodriving interviews*) as a data collection method was based on research supporting the use of visual memory prompts during interviews to elicit subjects' interpretations, perceptions, meanings, and understandings about individual or group social norms, reasoning, processes, and behaviours. Developed from a long history of photo-elicited interview techniques (Capello, 2005; Clark-Ibanez, 2004), video-elicited interviews use a semi-structured interview format during which the researcher presents video to the subjects as a way to help them recollect, describe, interpret, and explain their life worlds (Hurworth, 2003).

The reasons for using video-elicited interviews in this study are fivefold.

First, video-elicited interviews are effective in helping subjects access and vocalize tacit, relational, and embodied understandings of their contextualized lived experiences (Willis, Jost & Nilakanta, 2006, p. 256). For example, Raingruber (2003) used video-cued interviews to research and understand the patterns of lived interactions between nurse-therapists and their clients. Raingruber found,

The research approach of using videotaping combined with cued-recall interviewing was effective in accessing tacit understandings, embodied responses, skilled practices, and qualitative distinctions that would not have shown up to the same degree using another research approach. Capturing the moment-by-moment interaction patterns, shifting nuances, and multivalent

meanings was possible because of the access to nonverbal influences afforded by videotaping. Use of tape-assisted recall allowed clients and therapists to comment on facial expressions, gestures, voice tones, posture shifts, spatial relationships, levels of intensity, silences, and the overall pace of the session that would not otherwise have been noticed or remembered. (p. 1165)

Raingruber cites six other studies ranging from toddlers at play, to adults in the medical community, that have found video-cuing an effective method for accessing tacit knowledge.

A second rationale for using video elicited interviews was that they opened up alternate avenues of communication for subjects, especially 5-year-old participants, “who respond more easily to visual, rather than lexical, prompts” (Prosser & Schwartz, 1998). Research by Capello (2005, p. 181) found that compared to traditional verbal prompts, the use of photo-elicitation prompts with 6- to 9-year-old students provided “a richer perspective to emerge of the classroom community and the children’s perceptions about classroom writing”. He suggested that,

Children quickly grow tired of simply talking about what they know during the interview process. In addition, they sometimes struggle for words to accurately describe their processes for writing because they are limited by vocabulary, development, memory, and their ideas about expected behaviors in the classroom. Including photographs in the interview process has the potential to combat these problems. (Capello, 2005, p. 170)

Although Capello’s research involved a photo-elicitation interview, it was thought that video-elicitation interview approach would provide similar advantages over traditional print-based interviews.

A third reason is based on research by Butler (cited in Clark, 1999, p. 41) who found that the use of photo-elicitation (termed in this study as 'autodriving') with teenagers "increased the researcher's access to youthful experience" and "reduced self-consciousness, promoted uninhibited involvement in a group conversation, and permitted ready identification and shared stories." Furthermore, Clark (1999) used visual-prompting in her research into an 8-year-old diabetic's perceptions about his medical condition and found that,

Looking at pictures with the child constituted a shared activity that readily defined a shared, even egalitarian, context. Indeed, autodrivng implicitly structures a joint interaction between researcher and child that gave the child control and authority (since the children explained their own pictures). Thus autodrivng framed the interview as child empowering. (pp. 43-44)

In short, video-elicitation was used in this study to help reduce the power differential between the researcher and participants.

A fourth reason for selecting to use video-elicitation techniques was to provide another layer of configurational validity. That is, as subjects viewed and talked about the video during the interview, they often provided their own reflective interpretations and understandings of their actions. Schratz (1993) and Walker (1993) call this reflective information the "silent voice behind the talk". It is the meaning that cannot be accessed by traditional written or oral research methods, yet is closely related to and stimulated by reviewing highly contextualized visual information. Clark (1993, p. 40) warns that research that emphasizes the textual and ignores this 'silent voice', "discourages broad access to children's perspectives....[and] risks bypassing young children's own meaning systems entirely." She continues, "Left out of the traditional survey are nonlinguistic, nonnumerical features that are so important in early childhood: play, visual experience,

rhymes and music, feelings, bodily movement, as well as visual representation through pictures, drawings, and props”. The use of video-elicitation interviews sought to incorporate the ‘silent voice behind the talk’ for all subjects in this research project.

The fifth and final rationale for using semi structured interviews and open-ended questions in this inquiry was also based on the following array of important justifications: (a) the descriptive data did not exist in any other forms (such as diaries, other studies, letters, and so on); (b) the ‘thick’, nuanced, complex, and contextualized descriptive and interpretive data being sought could not be obtained through structured interviews or closed questions alone; (c) the process of allowing subjects to give feedback that *they* felt was important generated new layers of information and paralleled the ontological and epistemological assumptions framing this study; (d) semi structured interviews and open-ended questions allowed the researcher (and subjects) to pursue questions outside the questionnaire; and (e) the researcher was able to add configurational validity through “member checks”<sup>1</sup> (Yanow & Schwartz-Shea, 2006, pp. 103-108).

#### **3.3.4 Field notes**

The choice to use field notes to record the researcher’s perceptions and interpretations of participants’ observed and stated patterns of behaviour, as recorded in the transcriptions of audio/video data, was largely predicated on the belief that the researcher’s interpretations could develop another layer of configurational validity. Field notes also acted as a reflexive tool, in that they helped the researcher clarify or extend existing interview questions, develop new questions arising from subjects’ video recorded behaviours or interview answers, and develop ‘thicker’ descriptions of the

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<sup>1</sup> Member checks add configurational validity to research methodology and findings. Member checks usually involve the researcher asking participants clarification questions to ensure the researcher’s understandings represent the participants’ intended meanings, actions, and so on. In this case, the researcher reviewed the videos with participants to ensure his understandings paralleled their intentions, behaviours, and so on.

participants' behaviours, perceptions, and understandings. Field notes also were used to generate 'member check' questions that helped clarify and correct incomplete or incorrectly interpreted data. Finally, field notes assisted the researcher to "observe, record, and analyse [his] own role in and experience of the setting and its interactions" (Mason, 2002, p. 97), and insights from these notes were used to discuss, for example, the inquiry's rigour and limitations.

### **3.4 Procedures**

This section presents the study's subject selection procedures, describes the subjects, and details data collection, encoding, and analysis procedures. The pilot study and the procedures for developing the study's interview questionnaire are also discussed. Figure 4 visually outlines this study's research process.

#### **3.4.1 Recruitment and selection of subjects**

A purposive sample of 5 families was selected to generate qualitative data reflective of the types, patterns, and principles of new and multiple literacy learning and teaching practices naturally occurring between 5-year-old children and their families while using ICTs in their homes located in the large Canadian metropolis, Metro City (pseudonym). The sample was purposive in that the selection procedures sought to identify only those families using home ICTs with their 5-year-olds. The decision to research a purposive sample of 5 families rested on the knowledge that the collection and analysis of complex layered qualitative data for each family would be a very time consuming and resource intensive process. Furthermore, in the event that one or two families declined to participate midway through the study, or they found themselves running into difficulties generating data, a purposive sample of 5 families would allow at least 3 to continue generating adequate descriptive data.

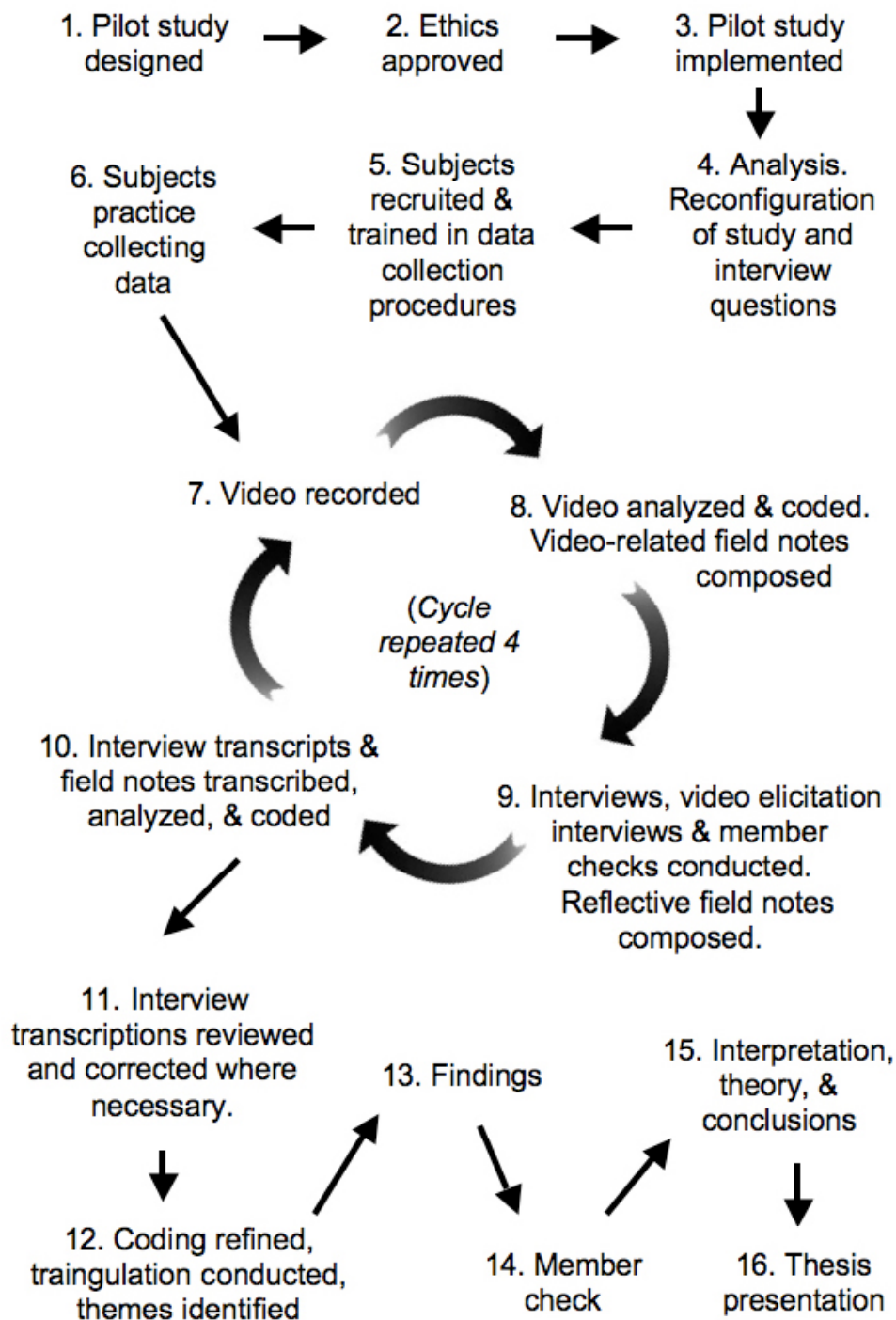


Figure 4. The research process.

Once permission to conduct research was received from the University of Victoria's Human Ethics Review Board on July 20, 2008 (see appendix A), a list of potential subjects was identified through the distribution of 117 recruitment letters (see appendix B) in early August 2008. Recruitment letters were distributed via email, Canada Post, or hand delivered to: (a) all 84 members of the local branch of the Provincial Home-Schooling Association (pseudonym); and (b) 33 parents of 5-year-olds entering Sanderson Public Elementary School (pseudonym) located within the Metro City area.

The decision to recruit home schooled children was predicated on research data that demonstrated a rapid and continuous growth in numbers of home schooled children both in the United States (Bauman, 2002) and Canada (Basham, Merrifield & Hepburn, 2007), and information that indicated that Canadian home schooled parents and children were increasingly accessing and relying on new ICTs, especially web-based ICTs (Basham, Merrifield & Hepburn, 2007, p. 11). The decision to include recruitment of children attending a multi-gendered public elementary school was to acknowledge that over 90% of children in both Canada and the United States attend such institutions (National Centre for Education Statistics, 2008; Statistics Canada, 2005;).

Upon receiving the recruitment letter, parents of potential participants were directed to read an online document explaining the study (see appendix C) and to contact the researcher if they wished to participate. Twelve parents contacted the researcher by phone and/or email, and indicated that they wished to have their 5-year-old child, themselves, and all of their family members participate in the study. Three respondents were parents of home schooled children and nine had their children enrolled in the Sanderson Public Elementary School. Aside from the three home

schooling parents, all the families lived in the boundaries of Metro City. Each parent also indicated that their 5-year-old child and his/her family members lived in the same house.

Within 1 week after the initial recruitment letter was mailed, the researcher was contacted by four more parents of 5-year-olds who had not been sent a recruitment letter. These parents had heard of the research either through parents who had received recruitment letters, or through conversations with the researcher. These parents were sent recruitment letters as well. All four of these parents indicated their family lived in the Metro City and their 5-year-old children attended a Metro City public school. Parents from two of these families contacted the researcher by phone, indicating that they wished to have their 5-year-old child, themselves, and all of their family members participate in the study.

During the initial phone contact with these 14 families, the researcher answered parents' questions about the project's goals and scheduling. He also used a interview screening tool (see appendix D) to ensure: (a) parents were the legal parent or symbolic parent of the potential 5-year-old participant; (b) parents had not worked with, or associated with, the researcher; (c) that the potential participants and their families could meet the time demands of the study; (d) that the 5-year-old had access and exposure to new ICTs in their home; (e) that the participants and their families were fluent speakers of English; and (f) the family members (including the 5-year-old) did not total more than five members.

Screening for parents who did not regularly socialize or do business with the researcher ensured prior relationships did not bias the data gathering and analysis. Screening for children who had access to new ICTs provided the researcher with best assurance for success in gathering data representative of children's new home ICT-based literacy practices. Selecting families who spoke fluent English maximized

communication. Selecting families with four or fewer family members willing to participate ensured data collection, transcription, and analysis did not become unmanageable for the researcher.

All 14 respondents indicated that their children met the first two selection criteria. However, two of the Sanderson Public School families had more than four family members living with the child (all of whom wished to participate), thus they were excluded from the study. All three home schooled respondents lived in communities outside the Metro City, thus these respondents were also excluded from the study.

The selection of the final 5 families from the pool of nine was based on obtaining a purposive sample. That is, the researcher chose as diverse a set of 'family configurations' (e.g., single parent family, two parent family, two sisters, two brothers, male 5-year-old, female 5-year-old, and so on) so as to maximize the types of families with which readers and viewers of this study could potentially identify. Thus the final 5 families were purposefully selected so as to ensure the sample included: 1) both male and female 5-year-olds, 2) as diverse an age group of parents and participating family members as possible, and 3) as wide a variety of family relationships and communication configurations as possible. Table 2 presents the names (pseudonyms) and gender of the five 5-year-old participants, the names and ages of their family members, and the relationship between the participant and each family member.

Upon selection of the final 5 families, all respondents were immediately informed by phone whether or not they were selected to participate in the study. The 5 families selected to participate were also hand delivered, emailed, or mailed by Canada Post one cover letter describing the family's responsibilities (see appendix E), and two copies of the research consent form (see appendix F). As a way to indicate informed consent, families and participants signed both consent forms and returned one to the researcher.

Table 2

Name and Gender of Participants and Their Family Member(s), and the Relationship(s) Between the Two (All Names are Pseudonyms)

Participant			Family Member		
Name	Surname	Gender	Name	Age (years)	Relationship to participant
Chris	Bronwell	Male	Kate	-	Mother
			Ron	-	Father
			Liza	Seven	Older sister
			Carmen	Ten	Older sister
Lily	Siperco	Female	Grace	-	Mother
			Mikkel	-	Father
Mark	Canford	Male	Sharon	-	Mother
			Alex	-	Father
			Elly	Three	Younger sister
Sena	Takashi	Female	Meri	-	Mother
			Kevin	-	Father
			Hope	Seven	Older sister
Nick	Fletcher	Male	Marika	-	Mother

### ***3.4.2 Sample description***

The sample is only described here in brief because a more detailed and layered description of each family is provided in chapter 4. The sample comprised of 5-year-old children and their families. Three children were male and two were female. All but one

male child, Nick, had both a mother and father living at home. None of the families had any grandparents, uncles or non-biological family members living at home. Nick's parents were separated, and although Nick visited his father regularly, only his mother consented to participate.

Two of the children, Nick and Lily, had no siblings and are occasionally referred to in this study as 'only children'. The remaining three children had siblings. Sena had a 7-year-old sister, Mark had a 3-year-old sister, and Chris had a 7-year-old sister and a 10-year-old sister. All of the 5-year-olds and their siblings were born and raised in Canada. Interestingly, all of the participants were either bilingual or spoke English and were attending a French immersion program.

All but four of the parents were born and raised in Canada. Lily's parents were born in Romania, completed their elementary and secondary education in Romania, and immigrated to Canada after completing their university degrees in Spain and working in Portugal. Sena's parents, Kevin and Meri, indicated that they and their parents immigrated to Canada from Japan during the 1970's. However, aside from Lily's parents, all adults in this study had lived the majority of their life in Metro City.

Although families were not selected to participate in this study based on socioeconomic factors, it was discovered during the interviews that all five families exhibited several socioeconomic similarities. First, seven of the nine parents were comfortable being described by the researcher as a "middle class wage earner" (earning between 40 to 60 thousand Canadian dollars per parent per year as defined by Statistics Canada, 2000). Two parents chose not to reveal data regarding their and their spouse's socio economic backgrounds. Second, all of the parents worked white collar jobs that did not require regular strenuous physical labour. For example, one parent was an accountant, two were chartered accountants, one a university instructor, one was a

forensic economist, another managed a family chain of hair salons, and one worked with local children's organizations. And third, all of the parents ranged between 35- and 44-years-of-age.

### **3.4.3 Data collection**

Immediately after permission to conduct research was received from the University of Victoria's Human Ethics Review Board (appendix A), a pilot study was employed (for more detail on the pilot study, see 3.4.5 Pilot study and development of interview questionnaire). By September 15, 2007 the pilot study had been completed, and guidance from the pilot study had been incorporated into the study's two-phase final design. By October 12, 2007 all research participants and their families had provided written consent to participate (appendix F). The study commenced on October 22, 2007 and was administered in two phases over a 15 week period (see Table 3).

The first phase was a three week 'orientation phase' that began October 22, 2007 and ended November 9, 2007. Early in this phase, the principal investigator met with each of the participants and their families one to three times and: (a) explained the study's objectives and data collection procedures; (b) outlined the subjects' responsibilities; (c) answered any subject's questions; (d) delivered a mini-DVD video camera, tripod, and blank recordable mini-DVDs; and (e) trained *all* subjects' how to use the mini-DVD video data collection equipment. The researcher also instructed all subjects on how to use the video recorder to capture as many family events as they wished for the remainder of the three 'orientation' weeks, and asked them to record at

Table 3

*Research Schedule*

Phase:	Phase 1: Orientation			Phase 2: Data Collection											
Cycle:	First Contact	Equipment Testing		1 <sup>st</sup> Cycle			2 <sup>nd</sup> Cycle			3 <sup>rd</sup> Cycle			4 <sup>th</sup> Cycle		
Week:	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15
Dates:	Oct 22-28, 2007	Oct 29 -Nov 4 2007	Nov 5-11 2007	Nov 26 -Dec 2 2007	Dec 3-9 2007	Dec 10-16 2007	Jan 14-20 2008	Jan 21-27 2008	Jan 28 -Feb 3 2008	Feb 4-10 2008	Feb 11-15 2008	Feb 18-22 2008	Feb 25-29 2008	Mar 3-7 2008	March 10-14 2008
Activity:	Researcher introduces subjects to data collection methods. Subjects test video equipment			Subjects video record examples of their own interactions using new ICTs	Whole family interview	Subjects video record examples of their own interactions using new ICTs	Interview with 5-year-old	Subjects video record examples of their own interactions using new ICTs	Interview with parent/s	Subjects video record examples of their own interactions using new ICTs	Final whole family interview				
Hrs/wk required of subjects:	2 - 4			2 - 4	1 - 2	2 - 4	1 - 2	2 - 4	1 - 2	2 - 4	1 - 2	2 - 4	1 - 2	2 - 4	1-2

least 1 hour of test video each week capturing the participants using new ICTs by themselves or with other family members.

During this first phase, subjects were also informed that the video cameras were quite solid (all five video cameras survived the study), that the researcher had two replacement video cameras just in case a camera broke down, and that subjects should not hesitate to unplug the camera from the wall socket, disconnect the camera from the tripod's quick release mechanism, and rely on the video camera's 4 hour battery supply to videotape the 5-year-old child's new ICT-based literacy practices anywhere in or around their home (e.g., child playing games on a cell phone in their bedroom). At the end of the orientation phase, all participants and their family members indicated they were comfortable with the mini-DVD video data collection equipment and procedures.

The second phase, a 12 week 'data collection' phase, began November 26, 2007 and ended March 14, 2008 (with a four week break over Christmas). Over the course of this phase, data were collected in three week 'cycles' (see Table 3). A three week cycle consisted of participants and family members collecting mini-DVD video for 2 weeks, followed by one week where no video was collected but the researcher met and interviewed the participants and/or their family members. A total of four, three week data collection cycles were completed.

During the weeks that video data was being recorded, participants and family members were asked to regularly record 'natural' instances of the participant using new ICTs in the home, including social interactions with other family members while using new ICTs. At the end of each of these weeks, the researcher collected the recorded video from each family and, with the help of *Any Video Converter Pro 2.08* video converting software, converted the videos into compressed MP3 video files. Families recorded between 1.9 to 3.2 hours of video each week during the video collection weeks

(see Table 4). A total of 104 hours of video was recorded for all families over the course of the study.

Table 4

Average Hours of Video Recorded Per Week Per Participating Family, and Total Number of Hours of Video Recorded Over the Course of the Study (All Names are Pseudonyms)

Family Surname	Average hours of video recorded per week	Total hours of video recorded over course of study
Bronwell	3.2	25.6
Siperco	2.4	19.2
Canford	2.9	23.2
Fletcher	1.9	15.2
Takashi	2.7	21.6
Average	2.6	21.0

During the weeks where no video was recorded, the researcher interviewed each of the families for 1 to 2 hours. A total of 20 interviews were recorded; four interviews per family. During the first meeting, the researcher administered the *Set 1 Interview Questions* (appendix G) to the whole family. At the second meeting, the researcher administered the *Set 2 Interview Questions* (appendix H) to the 5-year-old participant and any siblings that wanted to join in. *Set 3 Interview Questions* (appendix I) were administered to parents at the third meeting. *Set 4 Interview Questions* (appendix J)

were administered at the fourth meeting, and this was open again to the whole family.

Aside from questions designed to elicit very specific information about, for example, the number, types, and context of the home-based new ICTs (appendix G, questions 1-5) and the family's socio economic background (appendix J, question 12), the majority of questions were open-ended and presented through a semi-structured interview or video-elicitation interview format. The interviews were recorded using a digital recorder to facilitate storage, access, transcription and integration with the qualitative data analysis software.

Prior to the second, third, and fourth meetings, the researcher selected segments of video from previous weeks' recordings that either: (a) contained examples of the child's and/or family's behaviours using new ICTs that were unclear to the researcher (e.g., the researcher needed to know where in the house the participants were, how often a particular behaviour happened, and clarification of words spoken or meaning behind a gesture); or (b) contained examples of the participant's and/or family's behaviours that the researcher used to visually-elicite participants' and/or family member's reflections and responses.

The researcher then brought these selected video segments to the interviews and played them just before asking participants and/or their family members a clarification question or prompting them for their insights into their own actions or those related to the study's research questions. For example, on question nine of the third cycle interview questions (appendix I), parents were shown a video clip of their child using their family computer, and then they were asked to explain how they thought the way they learned to be literate was similar and/or different than the way their 5-year-old child was learning to be literate.

Similarly, on question two of the second cycle questions (appendix H), children were shown two videos. One of themselves using their home computer, and one of themselves working on a computer with one or more other family members. Then children were asked questions such as, “Can you tell me what you are doing in this video? You seem to enjoy using the computer...Would you tell me and/or show me your favourite things to do by yourself [and with family] on the computer”? In both cases, this visual-eliciting encouraged both participants and their family members to think about the specific literacy activities and behaviours recorded when explaining their own, and/or the participants’, teaching and learning practices using new ICTs. Subjects’ responses and discussions to these video-elicited prompts were recorded and transcribed.

In several cases, the researcher’s observations of the participants’ interactions and conversations with family members (and in some cases other participants) while using their new ICTs stimulated new questions about their patterns of teaching and learning that had not previously occurred to the researcher. For example, question number seven on the fourth cycle questions (see appendix J) was developed from the researcher’s observation of the deep trance-like state that many children entered when using new ICTs (especially during video game play). The question focused on understanding the parent’s perception of their child’s learning, and was not a question that had entered the researcher’s thoughts until this pattern was demonstrated across all of the children in the videos.

The researcher’s process of developing new questions from participants’ video supports this study’s ontological and epistemological positions which view knowledge as being contextual, interactional, and situational. Thus the research design was flexible enough to ensure that the interview was as contextual as possible, drawing upon or

'conjuring up', as fully as possible, the social experiences or processes relevant to the study's purpose (Mason, 2002, p. 64).

The researcher also recorded detailed field notes while viewing the videotapes, while reading the transcriptions, while observing three of the five children in daycare, and during and/or directly after each interview. The researcher used his laptop and pen-and-paper to record field notes. Field notes documented the researcher's perceptions and interpretations of participants' patterns of behaviour and understandings as exhibited in the interviews and transcriptions of audio/video data.

#### ***3.4.4 Encoding procedures and data analysis***

The researcher and research assistant used Express Scribe 4.05 digital transcription software to transcribe the 20 interviews during and after data collection. These were then converted into a rich text word processing file format, and imported into the NVivo 8.0 qualitative data analysis software program. The researcher then read each of the research assistant's interview transcripts while listening to the tapes to ensure the interview data were intact. Inconsistencies between transcriptions and audio tapes were corrected and any of the researcher's new and related observational field notes were entered into the NVivo 8.0 program.

Similarly, the researcher's field notes were either typed directly into the NVivo 8.0 data analysis program during the study or written on note paper and typed into the program afterward. When data collection was complete, the researcher reviewed the notes a second time to ensure the data entered were correct and coherent. Although both field notes and interview notes were entered into the same data analysis program, each was coded with unique identifiers so they could be analyzed separately and/or together.

Using a process of 'ongoing interpretation data analysis' (Mason, 2002), the researcher studied the interview and field notes again, reflected upon the research questions posed, and then used NVivo 8.0 and 'sliced' and separated 'incidents' (units of the participants' textual information or meaning in the data (Lincoln & Guba, 1985) being sure to annotate and label these data slices as they were formed. Then using a categorical qualitative data analysis proposed by Mason (2002, pp. 153-164), these annotated data slices were compared and grouped into indexing categories with other slices sharing similar patterns of behaviours, incidents, and interpretations. Then these categories were compared to determine if there were any major overlaps. If there were overlaps, categories were more finely defined and the slices were moved accordingly. During this process of category comparing and creation, categories that became too large were split only if they seemed to naturally demonstrate two new categories.

The researcher then used Express Scribe 4.05 transcription software to review the audio tapes again while reading the transcript to see if anything was omitted from the transcription, including punctuation, or to determine if there were any auditory clues, like inflections, that would change meaning not conveyed in the text. Then the data slicing and comparing and categorizing of the transcripts was repeated again, with these categories being compared to the categories from the initial coding. New and different categories were considered and amalgamated, added, or discarded. Data slices that exhibited complex social behaviours were placed in up to three different categories. Categories were only discarded if they became empty of slices, or if they duplicated an identical or very similar existing category. During this comparison of categories, any slices that did not fall in the same category were re/evaluated and placed into the most characteristic category.

The researcher's field notes were analyzed separately from the interview transcriptions, but the same data analysis process was repeated for both data sources. The data analysis of the videotapes followed a slightly different data analysis process. Once the researcher received a family's video disk, its surface was immediately labelled with the recording date/s and participant's name. The DVD was then converted to an MP3 file using Any Video Converter Pro 2.08. Due to the significant amount of video collected, and the limited amount of resources available to the researcher, participants' videos were not transcribed as were the interviews and field notes.

Next, the researcher used Inqscribe 2.0.4 to view each video disk in its entirety making field notes for any questions, or segments of video, that he would explore with the family at their interview or meeting. Then using categorical qualitative data analysis proposed by Mason (2002, pp. 153-164), the researcher used Inqscribe 2.0.4 to review each video disk while using MS Excel to code and record 'time slices' (annotated units of time) representative of subjects' observable (seen or heard) patterns of behaviour related to the study's research questions. These coded slices were then analyzed in a similar manner as the interview transcripts, in that coded slices sharing similar auditory and visual patterns of behaviours, incidents, and interpretations were grouped together. Also similar to the coding of the interview transcripts, the video was revisited a second time in order to: (a) split up categories that had become too large and exhibited a natural division into two new categories; (b) relocate incorrectly coded slices; (c) reassess categories with only one or two slices; and (d) delete empty categories.

All three forms of data, interviews, field notes, and coded video slices, were then reviewed in light of each question posed, and coded events were selected for their ability to provide the layered, rich, contextual descriptions of events that "encourages

the reader to get close to the meaning of those who experienced what the author is describing” (Goldman-Segall, 1994, p. 7).

### **3.4.5 Pilot study and interview questionnaire development**

The development and pilot testing of this study’s data collection and analysis instruments and methods occurred from May to August of 2007. Data collection for this pilot study involved digital video recording, researcher’s field notes, and semi-structured video-elicited focus group interviews. The main data collection tools were questionnaires (e.g., appendixes G through J).

The decision to use video data collection methods was predicated on the researcher’s belief that a study investigating new ICTs should integrate new ICTs into its own data collection, analysis, and dissemination. Additionally, a review of qualitative visual data collection methods confirmed the importance of using video-elicitation interviews to stimulate subjects’ recall (see *Data Collection* above), and for developing methodological validity (See *Research Quality and Rigour* below).

A literature review into qualitative research employing video-elicitation interviews was conducted in an effort to learn from other researchers’ experience and streamline the time and energy spent developing the pilot study and interview questionnaire. Although there were many examples of research and articles that discussed analyzing video directly, and articles discussing photo-elicitation methods, there were only four articles/books that focused specifically on video-elicitation methods (Raingruber, 2003; Leander, 2004; Rennie, 1994; and Schuck & Kearney, 2004). Knowles and Cole (2008) suggested a possible reason for the lack of video-elicitation methods in research, stating, “Video-elicitation was not popular in the past because it required cumbersome and nonportable equipment” (p. 410). The researcher also noted that it was only in the last 10 years that qualitative software has been developed to the point of being able to

handle the 'slicing' and coding of large amounts of digitized video data. Shkedi (2005) and Schepens, Aeltermann, and Keer (2007) were consulted to provide an introduction to video-elicited interview methods, and to develop a framework for sequencing the video-stimulated interview questionnaire within the study.

Unfortunately, none of the video-elicitation studies included their interview questions nor any detailed information about how they developed these questions. Thus the researcher drew upon Mason (2002, pp. 62-83) to form the majority of interview questions, and develop the researcher's general interviewing techniques. Westby, Burda, and Mehta's (2003) online document, *Strategies for Ethnographic Interviewing*, was accessed to refine the questions and reduce the number of 'leading' questions. Clark (1999) and Zwiers and Morrisette (1999) were referred to when developing interview questions and techniques sensitive to a primary-aged child's needs.

The pilot study's design was developed using guidelines from Mason (2002) and Shkedi (2005, pp. 73-75). As was the case with the final study, data collection for the pilot study was implemented in three week cycles, and was preceded by 2 weeks when the subjects practiced using the video equipment. However, the interview questionnaire was administered over only 6 weeks instead of 12, using two interviews instead of four, and involved only one family instead of five. Also unlike the families in the final study, the pilot study family was recruited by word of mouth. Nevertheless, the family did meet the recruitment requirements outlined in the final study and the subjects consisted of a 44-year-old working mother (a teacher), a 45-year-old working father (also a teacher), and their 5- and 9-year-old daughters. Documents similar to those listed in appendixes A through I were used to test the study's screening, training, consenting, and information distribution procedures. Documents similar to appendixes G, H, I, and J were used to guide the pilot study interviews. (Although the interview questions for the

pilot study were similar in essence to those used in the final study appendixes G, H, I and J, many were rewritten and/or reworded, two were removed, and three more relevant questions were added). Also unlike the final study, the researcher picked up and transcribed the video data every 2 weeks, the first interview followed a focus groups format, and the data were analysed using content analysis as proposed by Krippendorff (1980). The pilot study took place from June 4, 2007 until July 30, 2007.

The pilot study played a significant role in developing the manageability and validity of the study. First, it was quickly learned that video data needed to be picked up on a more regular basis than once every 2 weeks, as this left very little time for the researcher to view and analyze the video, and select segments of video to play back to the parents and/or children at the next meeting. In the final study, video was picked up at the end of *every* week as opposed to every second week in the pilot.

Second, due to time constraints, data transcription of the video could not occur before the next interview. Thus, the video was also not fully transcribed in the final study until after the study was finished. Third, because the researcher spent a great deal of time viewing and selecting video data, it became apparent that an experienced research assistant was required to help transcribe the interviews. A transcriber was hired to transcribe half of the final study's interviews.

Fourth, it was discovered that focus group interviews were not as viable a data collection method as expected. The 5-year-old child in the pilot study spoke very little during this first interview session. Clark (1999) discusses the many factors negatively influencing a child's reluctance to respond in an interview, for example,

The verbal interview relies primarily on linguistic communication. For very young children who are still acquiring language, this limits greatly what issues and questions the researcher can pursue. A young child's cognitive development also

challenges an interviewer who attempts to ask about abstract ideas without placing them in a tangible, concrete context (Clark 1996, cited in Clark 1999). In addition, young children seldom share information among themselves strictly through question-and answer sessions. This places a strict question and-answer interview outside their sociolinguistic repertoire. (p. 40)

However, prior to the second interview, the researcher decided to apply child-friendly interviewing techniques (such as involving a sibling in the interview or using visual elicitation procedures), as recommended by Clark (1999) and Zwiers and Morrisette (1999). The second interview was conducted without the presence of the child's parents, applied autodiving (video-elicitation) techniques as recommended by Clarke (1999), and was modelled around a game format as recommended by Zwiers and Morrisette (1999). This interview resulted in much longer interviews with the child and larger quantities of qualitative data being generated. This interview approach with children was incorporated into the second cycle interviews of the final study.

Fifth, subjects reflected upon each of the documents encountered in the pilot study and their feedback was incorporated into the final questionnaire listed in appendixes A to J. Interview questions that subjects found to be confusing, too wordy, or too difficult to answer, were reworded or eliminated.

Sixth, the subjects in the pilot study provided the most insight into the most likely new ICTs that would be video recorded, the most effective places the camera could be located, and helped determine the best angle-placement of the video camera for the final study (for example, even though subjects had been asked to record as many examples as possible of their 5-year-old child using new ICTs, the child's most frequent recorded use of new ICTs was while using the family laptop). Furthermore, after having taken video from a variety of angles and perspectives, (e.g., close up video of the child's

head and shoulders, wide angle videos of the child and family, video from in front of the child, video from behind the child, video catching what was on the screen, video more focused on the child, video on tripod, video off tripod, video shot from above, video shot from below, and so on) it was determined, and later recommended to the main study's subjects, that video which captured the largest amount of information about children's social actions could be gleaned from a wide angle shot, taken from the side of the child, framing most of the room, capturing as much as possible of the screen, and being shot from the child's eye level. Similarly, when not being used in a hand held situation (e.g., filming the child using a cell phone in the car) the camera was safest when placed on a tripod, out of the way of traffic.

Seventh, observations of pilot study videos helped develop new and more relevant interview questions for investigating subjects' interactions with new home ICTs. For example, it was noted that the 5-year-old in the pilot study was spending a great deal of time using the family laptop to access Internet games and websites (like Webkinz.com, an interactive online website for playing individual and social video games). This triggered the researcher to develop question number nine on the first cycle questions (appendix G) in an effort to develop a clearer understanding of the types of activities, and number of hours, the 5-year-olds spend online.

Finally, and most dramatically, the pilot study assisted in shifting the data analysis methods from content analysis to ethnographic analysis. This fairly major shift in data analysis method occurred as the researcher used familiar content analysis techniques to code the subjects' very detailed and complex interview data. In order to access and generate the multilayered and textured data required to describe and interpret the stories of these families (as opposed to just charting the surface patterns) a

more flexible, 'holistic', and contextually responsive data collection and analysis methodology and analysis would be required.

### **3.5 Research Quality and Trustworthiness**

According to Lincoln and Guba (1985; Guba & Lincoln, 1994), there are five general assessment issues that can be referred to when interrogating and assuring the quality and trustworthiness of a qualitative research study's design. These criteria are credibility, transferability, dependability, confirmability, and authenticity. These criteria are used to frame the following discussion into the quality, trustworthiness and critical thoughtfulness of this study's research design.

#### **3.5.1 Credibility**

For Lincoln and Guba (1985), the issue of credibility pertains to the degree to which an audience makes sense and develops confidence in the study's findings. This study employed five techniques for establishing this credibility. First, three separate member checks were employed during the study's data collection cycles, and once after the data were compiled. These checks helped ensure that meanings subjects communicated during interviews, and the researcher's interpretations of their behaviours and discussions as captured in the videotapes and his field notes, matched and/or paralleled that intended, experienced, understood or interpreted by the participants.

Second, it was through prolonged engagement with the subjects (e.g., five meetings with the subjects in their home, daily observations of 3 participants in their daycare, conversations with the subjects outside their schools, and extended viewing of the subjects' 105 hours of video recordings), that the researcher was able to establish the rapport and trust required to co-construct a scope of understandings and meanings representative of the context and learning/teaching behaviours and principles occurring as participants used or learned to use new ICTs.

Third, the researcher was able to examine the consistency of findings through the triangulation of methods and sources. For example, through the triangulation of different data collection methods (interviews with parents, interviews with children, video of subjects using new home ICTs, and the researcher's reflective field notes), and different sources (parents, children, researcher) the researcher was able to corroborate the finding that mentoring and role modeling was a persistent teaching/learning principle associated with children learning to use new home-based ICTs.

Fourth, once the researcher had established his sets of findings, he employed a 'deviant case analysis'. In this situation, he reviewed the data deliberately looking for information that contradicted information and principles emerging from the data. For example, after parents reported that they provided participants with full access to new home-based ICT software and hardware, the researcher reviewed the transcripts to find out if this was true. It was not. Data indicated that participants usually accessed software and Internet sites that parents had preselected for them. (Moreover, the issue of unlimited accessibility became a concern for one set of parents, as their child accessed questionable Internet content at a friend's home during the course of this study).

Fifth, it was through persistent observation of the subjects (e.g., repeatedly viewing their videotapes and interview audio and transcripts), that the researcher was able to focus in and identify the detailed data, the 'thick descriptions', most relevant to answering the study's research questions.

### ***3.5.2 Transferability***

When a qualitative study offers enough information to readers that they begin to be able to judge and apply the study's findings to other contexts, it is called developing qualitative research transferability. However, the goal of transferability in qualitative

research is not to be able to generalize findings to other populations, but to be able to paint a portrait of a situation so that an audience can make their own connections (often personal) with the research findings, and then between the findings and a context familiar to the audience.

In this study, transferability was developed in three ways. First, the selected sample included as much diversity in participants' gender, cultural background, sibling relationships, and parental configurations, as could be afforded by such a small sample. Second, the sample was selected from a community that contained a wide variety of middle class homes in a large Canadian urban centre similar to many middle class urban areas in Canada and North America. And third, detailed, nuanced, 'thick' descriptions of the subjects, the subject's home contexts, and their behaviours were provided in chapter 3 and chapter 4.

Although the sample was very small and each participant a unique human being, the study was intentionally designed to provide enough detail about the subjects, their relationships, their contexts, and their behaviours, so that readers would be encouraged to identify the broader applicability of the study's findings and "evaluate the extent to which the conclusions drawn are transferable to other times, settings, situations, and people" (Cohen & Crabtree, 2006).

### ***3.5.3 Dependability***

For Lincoln and Guba, the issue of dependability refers to the extent in which the researcher provides an audit trail outlining research decisions and the study's methods. Furthermore, a qualitative study exhibiting dependability produces findings that are consistent and stable across researchers and time.

This study's dependability was furthered in seven different ways. First, data collection was spread over five months, in varying times of the week, and varying times

of the day, so as to produce dependable results indicative of different time and day contexts. Second, all subjects were given the same interview questions so as make data comparable across families. Third, member checks occurred with the subjects when the researcher did not understand a subject's interview response. Fourth, all interview, field note and video data presented in this thesis are provided with audit trail indicators (Cresswell, 2007, p. 291) so as to locate them in the corpus of data.

Fifth, the researcher provided (earlier in this chapter) detailed descriptions and accounts revealing the justifications for using an interpretive ethnography research design, procedures and tools used for collecting, coding and analyzing data, and the process of interpreting and drawing conclusions. Sixth, a level of inter-rater reliability was provided through the researcher, and an experienced qualitative research assistant, transcribing and verifying the interview transcripts, and the researcher twice refining data slices in coded categories.

Finally, discussions into the study's research design and findings took place with doctoral instructors, peers, specialists in new literacy research, and advisory committee members. The advice and direction provided by these colleagues were incorporated into the written thesis in an effort to develop the study's dependability.

#### **3.5.4 Confirmability**

Confirmability involves the degree in which it can be demonstrated that the findings were largely shaped by the participants and not the researcher. In this case, Lincoln and Guba argue that the researcher must demonstrate how he minimized the influence of his biases, motivations, or interests on the findings. Along with the use of the audit trails, member checks, and triangulation methods already presented, the following paragraphs discuss three steps taken to increase this study's confirmability.

First, measures were taken to minimize the bias that video data collection methods could have on the study's findings. When it comes to video data collection, researchers have established that the presence of a video camera can adversely effect a research subject's everyday 'natural' behaviours. For example, according to Mason (2002),

Camera and other forms of recording equipment can make people feel self-conscious, sometimes frightened or intimidated, or as though they are under surveillance. Equally they can prompt people to want to capture the limelight and 'be a star', without always fully appreciating the consequences. (p. 118)

This effect was noted early in the pilot study, as the 5-year-old participant waved at the camera, danced in front of the camera, and smiled at it every time they or their parents turned it on. Similarly, the parents seemed very conscious of the camera, glancing at it several times after entering the video frame near the beginning of each recording.

To help mitigate this effect, subjects were given the video camera 3 weeks before the study. Additionally, they were encouraged to take as many 'family videos' as they wished, and they were instructed to practice recording as many instances of their and their child's natural new home-literacy practices before the study began. This helped the subjects become more comfortable with the video equipment and its presence in their lives. As a result, families seemed very comfortable with the video camera's presence as there were few examples of the children looking at the camera or performing in front of the camera, and only four instances when parents asked children if the camera was running.

Furthermore, many of the subjects, especially the children, seemed less affected by the camera than the researcher had expected. For example, two of the children frequently started the video by themselves, hopped up into the chair in front of the

computer and began working away without another indication that they were aware of a video camera being directed their way. The parents of the other three children regularly turned the camera on for their children, but here again the children became so deeply engaged with their new ICT that they completely ignored the video camera. By the second week of the study, parents and siblings automatically turned the video recorder on and rarely turned to look at the video recorder before the recording disk ran out. This obliviousness to the camera was especially evident when the children were playing particularly engaging video games.

Subjects' comments recorded in the researcher's field notes also indicated that the video camera's 'intimidating' or 'star struck' effect was not as large a problem as first feared. For example, on the day the researcher dropped the video equipment off at Sena's home and began training the family how to use the equipment, Sena's father, Kevin, remarked, "That's okay, I have two digital cameras of my own...my kids are used to being filmed". Similarly, Kate, Chris' mother, alluded to her children's familiarity with the cameras during the first interview when she said "Oh Carmen, actually, yeah, they do take pictures using the cell phone. I don't". Also, on the day the researcher dropped the video camera equipment off at his house, 5-year-old Chris said, "My dad knows how to use this [video recorder] he works with computers".

Finally, it seemed that the two or more weeks 'lead time' gave participants the time to become familiar with the novelty of being visually recorded, and may have helped reduce the negative effects the video camera would have had on the subjects' 'natural' teaching and learning patterns while using new home-based ICTs. However, it may also be argued that because all of these participants were accustomed to friends and family viewing them through the lenses of cell phones, video recorders, and cameras, these participants were already comfortable viewing and being viewed through

these same lenses. Thus the turning of this study's lens on them would have been nothing too far out of their social norm, and thus would also explain why the video recorder seemed to have less an influence on subjects than anticipated.

Second, because cameras can not record smell or physicality, and because they crop audio and visuals, they create bias (see, limitations of research design below). In order to minimize this bias an increase confirmability, the subjects were advised to keep the camera within 8-10 feet of the participants, with the lens set on wide angle (to maximize video input) and to ensure there were no obstructions on the microphone (to maximize auditory input).

Third, the researcher referred to Mason (2002, pp. 68-73) to create interview questions that minimized bias, and then used Driscoll and Brizee's (1995) suggestions for 'Creating Good Interview and Survey Questions' to weed out biased and leading questions.

### ***3.5.5 Authenticity***

According to Guba and Lincoln (1994), authenticity focuses on determining the study's fairness, ontological authenticity, educative authenticity, catalytic authenticity, and tactical authenticity. As this study was not situated in critical theory or researching issues of transformation, restitution and emancipation, issues involving this study's catalytic and tactical authenticity will not be discussed.

The study promoted fairness in that procedures ensured participants were treated ethically (see section 3.6 Ethical considerations). Furthermore, the researcher allowed all subjects' voices to be heard through a variety of interview formats. For example, subjects attended whole family interviews, interviews just for participants, video elicited interviews, interviews where the participants demonstrated what they were talking about, and interviews just for parents. These structures allowed children who

were intimidated by the researcher to express their views alongside siblings and parents. Member checks also ensured the information and understandings gathered by the researcher matched or paralleled those understood by the subjects. Finally, the voices of parents, participants, and siblings were not given differentiating weights during data encoding.

The ontological authenticity of the findings in this study were also addressed. For example, subjects were asked in the last interview if the study had any effects on them, and/or if they learned anything from participating in the study. Most participants indicated they were happy to be able to show the researcher how they played their computer games. However, the study's effect on adults were summarized in chapter 1 when one mother indicated that she felt the study had increased her awareness of her own role in her child's learning to use new ICTs, and the important role she played in actively helping her son access appropriate Internet information.

Finally, educative authenticity is developed when a study demonstrates an appreciation for others' constructions (Rodwell & Byers, 1997, p. 118). In this study, educative authenticity was demonstrated in the literature review where research from contradictory theoretical viewpoints are presented in light of the theory informing this study. Similarly, educative authenticity is represented in the act of bringing together four theoretical perspectives (one of which can be seen as ontologically incommensurable with the other three) to bear on a discussion of this study's findings.

### ***3.6 Ethical Considerations***

According to Denzin (1989), a researcher's primary obligation is, ...always to the people we study, not to our project or to a larger discipline. The lives and stories that we hear and study are given to us under a promise, that promise being that we protect those who have shared them with us. (p. 83)

Additionally, the fact that this study involved the collection of highly sensitive visual data in the homes of very young children, also demanded that particular care be taken to maintain the rights of these participants.

To ensure all subjects' informed consent was freely given, the researcher ensured that subjects fully understood:

1. Their roles and responsibilities (including time commitment to attend interviews and to produce video of they and their 5-year-old using new ICTs in the home setting);
2. They could decline to answer any interview questions and withdraw at any time without any negative consequences or any explanation;
3. They could withdraw from the study but give the researcher written permission to use subjects' partial data;
4. They could withdraw from the study completely at any time and have all their data incinerated;
5. Their data would be identified using pseudonyms;
6. Any audio and visual data revealing any participant's names or physical locations would be erased, digitally diffused (made unclear), and/or voiced over with silence or pseudonyms;
7. Only the researcher, research supervisor, and research assistants would have access to, and control of, the data, including the transcriptions;
8. Data would be stored on DVD disks in a locked cabinet at the researcher's home, and on his password protected laptop and hard drive. All of these were located in his locked household;
9. Subjects had the right to view, review, and listen to all video and audio data, and to request that the researcher digitally diffuse, delete and/or incinerate any video and/or audio the participant felt was unsuitable for non-family members to view and/or hear;

10. Subjects had the right to restrict segments of video, audio, and selections of video 'stills' from presentations of the findings (but allow the researcher to include the transcriptions of the video and/or audio in the data analysis);
11. The researcher would never release data to the popular media or allow data to be used for commercial purposes (aside from that contained in the final published thesis);
12. The researcher would present data only at scholarly educational presentations and in scholarly publications;
13. Data from anyone who had not signed a consent form would not be gathered.

Also prior to obtaining subjects' voluntarily signed consent forms, the researcher:

- (a) determined that there were no known conflicts of interest or anticipated risks to any of the subjects as a result of their participation in the study;
- (b) informed the subjects that every third week he would verbally remind the subjects of their research rights and request their continued participation;
- (c) made it clear that their participation did not come with any payment or compensation;
- (d) explained the possible inconveniences, benefits, and harms to subjects, society, and 'the state of knowledge';
- and (e) ensured subjects had the opportunity to have all their questions answered by the researcher and/or research supervisor.

Additionally, before obtaining subjects' written consent, the researcher made sure subjects were made very clear that: (a) even though steps were taken to maintain the subjects' privacy, their anonymity and confidentiality could not be completely protected because video 'stills', video, and audio data would identify the consenting subjects; and (b) by signing and dating the consent form, subjects were not only indicating that they understood the conditions outlined on the consent form (appendix F), but that they were also consenting to allow the researcher to use video 'stills', video

recording, and audio recording in his dissertation presentation and future scholarly presentations that would audio/visually identify the subjects.

Moreover, parents and the researcher read and explained the research overviews and consent form to the youths (13- to 18-years-of-age) and the children (13-years-of-age or under), before obtaining their written consent. This helped children understand their roles and responsibilities in the research process, as well as familiarize them with the researcher and his roles and responsibilities in the upcoming four months.

All participating adults (18-years-of-age or older) provided free and informed consent by signing and dating the consent form. All participating youths and children were encouraged to sign and date a consent form, however parental written consent on the youth's and child's consent forms was mandatory.

The choice to use video-elicited questions in a semi-structured interview process was a conscious decision to help to reduce the tension and power differentials between the young participants and the researcher. Similarly, the researcher used his experience as a primary teacher, 'autodriving' interview suggestions from Clark (1999), and suggestions for integrating 'play' in children's interviews from Zwiers and Morrisette (1999), to create an interview structure that would give the child more control and authority over the experience. In addition, all interviews were conducted in a place of the participants' choosing, with most being held in subjects' kitchens, living rooms, 'play rooms', bedrooms, computer rooms, and local coffee shops.

In an effort to help the subjects, especially the young participants, feel more comfortable interacting with the researcher, especially during interviews, the researcher volunteered to work in the Sanderson Public Elementary School's Day Care Centre (the researcher had been volunteering at this daycare for two years prior to this study).

Three of the five children in this study attended the Sanderson Daycare Centre. In the 9

weeks leading up to the study, and throughout the study, the researcher helped daycare staff execute their program as they saw fit. The researcher was never involved with any program implementation involving the daycare's new ICTs. The interactions between the researcher, daycare staff, participants and their family members, helped him get to know both the parents and children in a less structured manner, which also helped these families, especially the children, feel more comfortable with the researcher's presence during the study.

Both the interview structures and pre-study interactions between the researcher and subjects embody the researcher's ontological and epistemological belief that descriptive data are best generated and accessed through qualitative procedures such as engaging oneself in the cultures being explored. Furthermore it supports this researcher's belief that by taking the steps to build familiarity between researcher and participant before the interviews, and by using qualitative interviewing techniques that encouraged subjects, especially children, to have more control and input into the interview process, then the interviewees would be more responsive during the interview and "likely to generate fairer and fuller representations of the interviewees' perspectives" (Mason, 2002, p. 66).

Finally, using a process of provisional consent, subjects were reminded at the beginning of every meeting with the researcher that their participation was voluntary, that they could quit at any time, that all the data would be destroyed without question and without any repercussions to themselves.

### ***3.7 Limitations of Research Design***

As is the case with collecting and analyzing non-video-based data, the decisions on how, when, and what to video record for this study are never neutral (Goldman-Segall, 1989; 1996). In this study, it was decided to give subjects a considerable amount

of control over the 'when' and the 'what' of the video recording that they were to submit as evidence of their child's 'natural' individual and social interactions using new ICTs in the home. Having subjects decide when to videotape and what to include as representative of their and their children's literacy practices is grounded in an interpretivist philosophy that not only sees people as a primary data source, but seeks their perceptions or what Blaike (2000) calls the 'insider view', rather than imposing the 'outsider view'. Although the researcher's field notes and interview questions may have provided opportunities to incorporate the 'outsider view' (which in turn added to the layers of 'configurational validity', Goldman-Segall, 1995), it could be argued that the video captured was biased largely towards what the participants' and their families chose to represent as being indicative of the participants' interactions and behaviours when using new ICTs.

Similarly, the researcher was solely responsible for selecting video clips for the video-elicited interview prompts, and was the only one who watched, categorized, and made annotated field notes of the subjects' video. This methodological approach could also be viewed as problematic in that the video selected represented what the researcher felt was important to focus on and less that of the subjects (and that experienced by readers of this study).

It is also important to note that although the video camera can add thick layers of visual and auditory detail that can add a sense of 'being there', video still cannot fully capture nor tell the whole story (DuFon, 2002, p. 45). For example, in this study the researcher urged participants to place the video recorder about 8 to 10 feet away (if possible) from the subjects being recorded, and record as wide an angle as possible. This was a deliberate request so as to avoid 'cropping out' too much context which Mousley (cited in Shuck & Kearney, 2004) cautioned would result in decontextualized

audio-visual information, and “greater potential for biased choice” (p. 30). Even with these wide angle shots, the video still could not capture what was happening behind the camera, the effect that smells might have on the participant, and the impact that sounds outside of the range of the directional microphone may have had on the children and their families.

Furthermore, even though the audio recording equipment used in this study was of high quality, the natural cropping that digitally recorded audio undergoes could be said to added further bias. For example, the highs and lows of vocal tones in the video recordings were clipped somewhat and it could be argued they could change the meaning of the message heard by the researcher. In short, the limitations of the camera’s technology presented its own ‘bias’ in the data that it did, and did not, capture.

Another limitation with using video in this study was that both relevant and irrelevant information were recorded at the same time. Furthermore, it can be argued that the very engaging nature of the irrelevant information may have even pushed some of the relevant information aside. Stigler, Gallimore, and Hiebert (2000) explain this limitation in regards to video,

The concrete nature of video images can be problematic, even if the camera is pointed in the ideal direction. Concrete images can be quite persuasive to the human information processing system, even if they turn out to be completely unrepresentative of what typically occurs. (p. 91)

Although the researcher was well aware of this extraordinary power of video to engage him on ‘tangents’ away from his rigorous analysis of the video, and he made conscious efforts to keep his mind focused on the purpose of the study, he would be remiss if he did not also acknowledge that the nature of the medium may have assisted in helping him miss relevant information.

This study was conducted in the homes of five families. While the subjects exhibit a diversity of types, patterns, and principles of new and multiple literacy learning and teaching meaning-making practices seen naturally occurring within their homes while accessing and using home-based ICTs, it must also be acknowledged that these behavioural patterns and principles do not represent all possible teaching and learning approaches that occur within all homes. Furthermore, even though the researcher was able to regularly observe three of the participants as they used daycare computers before and after school, it must be noted that the findings from these observations can not be seen as representative of the manner in which children in general use their daycare's new ICTs and develop associated new literacies. Finally, the home contexts of the participants and their families, and their access to ICT hardware and software, will not be representative of all families' home settings and access to ICTs.

Due to resource limitations, video conversations were not transcribed. This eliminated the opportunity to employ conventional orthographical analysis paralleling that used for the analysis and categorization of the transcribed interviews and field notes. The lack of transcriptions for the video also reduced the opportunity to refer to printed text (although the audio was reviewed) to "clarify what's said, by whom and in what way, and to begin to explore potential relations between aspects of the interaction" (Heath & Hindmarsh, 2002).

Finally, it is important to note that the researcher was only able to observe three of the five children in their daycare setting. Thus data may more descriptive of these three children, and not the whole sample. Consequently it must also be acknowledged that the interpretations and conclusions deduced from daycare data is limited in its descriptive applicability to three of the five families.

### **3.8 Chapter Summary and Chapter 4 Preview**

This chapter presented the study's methodology. The rationale and theory supporting the use of an interpretivist ethnographic research design were discussed, and data collection tools were presented (video recordings, reflective researcher field notes, and interviews/video elicitation interviews). Procedures for the pilot study and the main study were detailed, and the study's methodological rigour and limitations were reviewed.

Chapter 4 presents the findings related to this study's first two questions, "What home teaching/learning contexts exist for 5-year-olds learning to use new ICTs", and "Who is teaching 5-year-olds how to use new home-based ICTs"? The chapter is divided into two sections. The first section presents descriptive data representative of each of the five participants' home contexts, and the sample as a whole. The second section presents descriptive data outlining who (and or what) is responsible for teaching each of the participants to use the computers. It also, presents the differences and similarities between and across families.

## Chapter 4: Findings – Home Contexts and Teachers

### **4.0 Introduction**

One of the purposes of this explorative ethnographic study is to access and generate layered, rich, contextualized data describing how 5-year-old children come to learn to use new ICTs and develop new literacies in their home settings. The findings presented in this chapter strive to meet this purpose by providing descriptions outlining: (a) each participant's home contexts; and (b) the social home-based teaching and learning interactions occurring between participants and other family members and friends. Such descriptions not only begin to answer this study's first two research questions, but they also provide the detail readers require to more closely 'see' and understand (and/or possibly relate to) the social and physical home contexts in which the children learned to use new ICTs.

This chapter is divided into two sections. The first section is titled 'Home Context' and presents data describing each participant's: (a) physical residence; (b) personality and hobbies; (c) interpersonal dynamics with families and friends; and (d) access to the types and numbers of ICTs. It then compares and contrasts the data for all subjects, paying special attention to the similarities and differences between and across all participants and their families.

The second section is titled, 'Teachers', and follows a similar format as the first section. That is, coded data for each family are presented that describe who (and or what) is responsible for teaching participants to use new home-based ICTs. The data is then compared and contrasted between and across all participants and their families, and findings representative of similarities and differences between families are presented.

## **4.1 Home Context**

### **4.1.1 Bronwell family**

The Bronwell family consisted of five members and was the largest family participating in the study. They lived about eight blocks away from Sanderson Elementary School in a single detached 1960's English arts and crafts heritage-style home in a neighborhood comprised of similar residences. Their front door was often decorated with children's art work and holiday school crafts, and when the weather was warm and dry the family could often be seen cycling to and from school together.

Chris was the male 5-year-old focus participant for the Bronwell family. He loved to play physical sports and regularly played hockey and soccer during the study. Chris was also one of the participants that attended the Sanderson daycare where the researcher volunteered. The researcher often observed Chris engaged in some very competitive and energetic after-school outdoor games such as tetherball, Frisbee, and soccer. Similarly, on rainy days the researcher frequently observed Chris inside the daycare playing competitive board and computer games with his friends. Chris was a self assured and confident boy who also had a talent for stopping and actively listening to others. Furthermore, the researcher regularly observed Chris's friends asking Chris to play games with them, and on two different occasions the researcher observed children stopping to listen to what Chris had to say about a daycare computer game (BN5 14/01/2008 & BN12 02/07/2008)<sup>2</sup>. These observations indicated that many of Chris' peers enjoyed Chris' company.

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<sup>2</sup> In an effort to maintain an audit trail (Cresswell, 2007, p. 291), data references have been coded to point to their location in the set. For example, for this code above, BN5 14/01/2008, the B indicates the data is from the Bronwell Family data, the N indicates that it is a researcher's field note, the number 5 indicates it is the 5<sup>th</sup> note in the Canford's set of notes, and the number 14/01/2008 indicates the MM/DD/YYYY the field note was written. Moreover, a code of BV3.2 0:00-1:25 indicates the data is from the Bronwell data set, the V indicates the data is video, the 3.2 indicates the cycle (3) and the disk (2), and the 0:00-1:25 is the time duration of the video.

At home Chris was no different. He thoroughly enjoyed playing fast moving computer games that challenged him to solve puzzles and/or had a shoot-to-win format (e.g., Club Penguin BV2.4 3:30-5:00, Webkinz BV2.2 5:00-6:00, and Jumpstart BV1.9 15:00-23:35). Chris also enjoyed either watching or playing computer games well above his grade level. For example, just under 20% of the Bronwell's recorded video captured Chris working with his grade two sister, Liza, in playing and solving puzzles in her grade two level computer video games (e.g., BV1.4 0:30-6:50), and three videos found Chris observing playing videos with Carmen (e.g., BV1.7 0:00-3:30).

Liza was Chris' 7-year-old sister and judging by the large amounts of time she was caught on the research videotape, she could easily have represented another focus age group in this study. She loved playing competitive computer games and enjoyed working with Chris in solving some of her video game puzzles. Both Liza and Chris greeted the researcher at their front door on interview nights and were eager to ask him questions about the research and or show him what they were doing with their new ICTs. During the first and third interviews, Kate had to ask Liza and Chris to settle down and stop interrupting the interview.

Carmen was the oldest child in the family and was attending grade five at the time. Although the researcher saw her at school occasionally and she did say 'hi' when we passed in the school halls, she rarely entered the video frame at home, and did not participate in any of the study's interviews. However, as the reader shall see, she does play a role in Chris' and Liza's home experiences with new ICTs.

Kate and Ron were Chris's parents and were two very busy people. Aside from the time commitment required to get three children's homework done and shuttle them to their respective after school programs and organized sports, Ron worked full time in the field of telecommunications, and Kate worked part time as an accountant for a

nearby university. Kate also volunteered at many school functions and could be seen helping out with the accounting for the school's biannual book fair in the school gym.

As indicated in Table 5, the Bronwells accessed the widest variety and largest number of new ICTs in their home. Kate explained that this was largely due to her husband being "fairly technical" and because "he was in the cell phone business for many years so that's his interest with a lot of this stuff" (B1Q1). As a result, Chris had been exposed to many of these ICTs from an early age, began using a computer by age three, and was able to independently access and use most of these ICTs at the time of this study. The only equipment Chris rarely used was his parents' work laptops. He also had to request permission to use his parents' cell phones. An example of Chris's independence with these new ICTs occurred during the researcher's first visit to the Bronwell's home when within the first 5 minutes of the researcher's arrival Chris eagerly demonstrated to the researcher how the Bronwell's Sonos wireless stereo music system worked, especially how Chris could use the wireless remote to choose his own music and have different family members' music play in different rooms (BN2 12/11/2007).

Kate also indicated that her children's use of these new ICTs was unscheduled, spontaneous, and occurred whenever her children showed interest. Reviews of the video indicated there were few struggles over who was to use the parent's bedroom computer (this may have been due to the fact that the family had access to other computers). In fact, Chris and Liza seemed to enjoy, for the most part, taking turns and working together when playing, for example, their online computer games (BV1.14 4:40-6:23).

Although Chris could independently access and use a variety of communication technologies, Kate noted that the time he spent each week using cell phones and MP3 players was negligible, and the time he spent using his father's Palm Pilot and the

Table 5

Types and Numbers of New Home-Based ICTs Used by Participants, Listed by Family Surname

Type of New ICT	Numbers of New ICTs by Family Surname				
	Bronwell	Siperco	Canford	Fletcher	Takashi
Cell Phone	1	2	0	1	1
Palm Pilot/ Blackberry	1	0	2	0	1
CD-ROM Player	1	2	1	1	3
DVD Player	2	2	1	1	3
Desktop Computer	3	0	1	1	1
Laptop Computer	4	1	1	1	1
Nintendo DS	0	0	0	0	1
iPod Shuffle	2	0	0	0	0
iPod Classic	2	0	2	0	2
Sonos Music System	1	0	0	0	0
Digital Camera	1	0	1	1	1
Digital Video Recorder	1	0	1	0	1
Karaoke Player	0	0	0	0	1
TV sets*	2	1	2	1	1
Total number of ICTs	21	8	12	7	17

\* TVs listed in this table include both old (cathode ray) and new (Liquid Crystal Display/Plasma) TV technologies. Both old and new TVs were included as 'new' ICTs because all families had their TV sets interfacing with new ICTs such as DVD players, Blue Ray players, digital sound systems, and so on.

family's CD-ROM player was about one half an hour each per week. However, Chris did spend 4 hours a week watching DVD movies on their television in the family recreation room, and 6 hours a week on a desktop computer located in the parent's bedroom.

The computers Chris was videotaped using had high speed Internet access. Kate noted that this high speed access facilitated Chris's online computer gaming, even though this was not the main reason this access was purchased. She stated,

We have had it ((high speed Internet access))<sup>3</sup> for years but at one point my husband worked from the home, so I suppose, as far as having high speed (.) plus just the fact that we have both worked with computers for so long in the office that we couldn't come home and work on anything that was so slow. That's the reality of it. If I was a person who never used the computer myself would I think it was important that my kids have it? Probably not at the preschool age. If you just had the computer you could just go out and buy games on discs. (B1Q9)

Chris did use the family's high speed connection and computer during this study, especially when independently accessing and using online games and websites such as JumpStart World, Club Penguin, Webkinz, Hot Wheels, MSN Games, nhl.com, The Cartoon Network, Fun Brain, and YouTube videos. In short, Chris Bronwell had ample access to a wide variety of new communication technologies and used them regularly throughout this study.

#### ***4.1.2 Siperco family***

Lily and her parents, Grace and Mikkel, lived in a bright two level town home in an area of Metro City that, over the past 25 years, has seen single detached homes replaced by higher density condominiums and town homes. Technically speaking, Lily is

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<sup>3</sup> Transcription notations for this study are drawn from the Jefferson Transcription System (Jefferson, 2004,13-31).

listed in this study as an “only child”. However this label proved to be somewhat of a misnomer as Grace and Mikkel regularly scheduled play-dates between Lily and her friends, they frequently took Lily to play with neighborhood children at the nearby community center, and they enrolled Lily in her elementary school’s after school daycare. Lily’s art work and writing covered a great deal of the Siperco’s refrigerator and front room walls and there were many pictures of the Sipercos on the fireplace mantle and on the book shelves in the front room. The photos captured the many places they had visited and lived in Europe and Canada, and reflected the laughter and love that naturally emanated between the Sipercos.

Lily enjoyed swimming, playing at the local community centre, arts and crafts, reading, watching movies, and imaginary play. Every week Lily seemed to have a new and different diorama of farm or city scenes set up on the front room floor or on her play-table. The scenes were composed of plastic *Polly Pocket* figurines, cars, dinosaurs, *Littlest Pet Shop* animals, and homes and roads constructed out of coloured paper. Each time the researcher visited Lily, she was eager to show off her new scene and tell the researcher the stories behind the imaginative play that had led to its construction.

Lily did not attend Sanderson elementary and thus the researcher did not have the opportunity to observe Lily in a daycare setting. Mikkel and Grace, however, provided some insights into Lily’s personality outside of the home, indicating that Lily was cautious when entering new environments, learning new skills, or experiencing new learning situations at daycare. Mikkel explains,

Always whenever we went in a new environment, for her, she ((Lily)) always stayed near our side and watched all the children what they were doing. For a few minutes, even 10 minutes, 15 minutes. Whatever time she needed and then

she started to do certain things. She never just ran to get the help first, then just jumped (.). She never did that. (S1Q7)

Grace and Mikkel immigrated from Romania to Portugal in the late 1980's so that Grace could complete her Ph.D. and Mikkel could complete his post doctoral work. They emigrated to Canada in the mid 1990s to, as they put it, "seek a better life for ourselves". Since then Grace completed a Masters of Business Administration at a Canadian University and Mikkel completed a Diploma in accounting at a Canadian School of Technology. At the time of this study, Mikkel was working on his Certified Management Accountant designation and was working as a Health Systems Planning advisor.

The Siperco's had the second smallest number of new ICTs in their home in this study. However, they indicated that they frequently accessed and made use of new communication technologies, especially their Internet capable laptop, to regularly contact friends and family in Canada, Romania and Portugal. Lily was able to access and use all of the Siperco's new ICTs, and during this study, demonstrated a particular affinity towards using her parents' phone to take pictures and to talk to family and friends. She also used the DVD player twice a week to watch movies on their television, and played Internet games, like Webkinz, on the family computer. Lily had accessed and used all of the family's new ICTs. However she did not have unrestricted access to these ICTs because Grace and Mikkel were somewhat concerned about "having control of the programs or material she [Lily] was listening to or viewing" (S1Q3). Nevertheless, Lily did know how to independently: (a) use the cell phone to regularly and independently take pictures; (b) load VCR videotapes by herself; (c) insert and load some CD-ROM computer games on the family laptop; and (d) load and play music on the CD-ROM player located in her bedroom.

Aside from the DVD and video player, Lily's use of each ICT seemed to come in ebbs and flows. Mikkel explains,

My feeling is that she ((Lily)) always wants to use them ((new ICTs)) one, two, three, or four days in a row and then for 2 weeks she doesn't use them any more (.). When she was really interested in something, or mastering something, she just focused for a few days in a row on that thing. (S1Q4)

Because of these ebbs and flows, Grace and Mikkel had difficulty estimating the time Lily spent using each ICT, but they did remark that Lily used the phone at least once a week, the DVD and VCR a total of 4 hours a week, and the computer was being used about every third evening during the course of the study.

The laptop Lily used throughout the study had high speed Internet access. Once she had obtained permission, she could independently access a variety of CD-ROM games like *Thomas the Tank Engine* and *The Magic School Bus*, and access online web sites like Barbie.com and Webkinz.com. Although Grace and Mikkel had originally purchased high speed Internet access to facilitate their own educational assignments, read Romanian online newspapers, communicate with family, and develop Mikkel's accounting business, they jokingly added that it was Lily's drive to access the Webkinz website that made this service most valuable. Furthermore, Lily's parents often used the high speed connection to access websites that had information on questions Lily was asking, both those generated inside and outside the classroom.

One incident that happened during the third cycle of the researcher's interviews with the Siperco's (SN6 01/15/2008) illustrated Lily's motivation towards using new ICTs at home. During the interview, she came running into the front room and pulled Mikkel's cell phone out of his pocket and began taking pictures of us. She took pictures while standing on the couch, lying on the floor, while she was upside down, and from up close

or far away, always being sure to show her 'best pictures' to the closest adult available. Not only did these new ICTs provide many answers to her questions, they also offered portability, instant feedback (pictures developed instantly), and she very much enjoyed their highly visual nature.

#### **4.1.3 Canford family**

The Canfords lived in a two story 1970's three level townhouse adjacent to a mid-size indoor shopping centre and about five blocks away from Sanderson Elementary. Mark was the male 5-year-old selected for this study and he had a 3-year-old sister named Elly. Mark's parents, Alex and Sharon, both worked out of the home. Sharon worked part time so she could shuttle Mark back and forth from school and have time with her children for part of the week. Alex had taken on a new position in his company that required him to regularly fly to another Canadian city which took him away from home for large portions of the week.

Mark attended the same kindergarten class and after school care as Chris and Sena. However, because all three were attending daycare part time they were not always together through the week. Mark enjoyed field sports like football and soccer and was often seen competing on the field with the other kindergarten boys. Occasionally he played board and computer games with Chris at daycare, and regularly played with the daycare's cars and building blocks.

At home, Mark had his own audio tape/CD-ROM player which he could independently access and use at any time. He was required to ask permission to use most of the Canford's other ICTs. His father's Blackberry was the one ICT Mark could not use. He enjoyed using the family's *Apple* desktop and laptop computers to play online video games (e.g., hotwheels.com and pbs.org), watch hockey game highlights (e.g., nhl.com), and play CD-ROM games that he and his mother borrowed from the

public library (e.g., *Curious George*, *Clifford*, and *Arthur*). He also enjoyed watching TV shows, taking pictures with the family's digital camera, watching DVD movies, and using his mom's cell phone to call his father and grandmother. He spent about 4 hours a week on the computer, 2 hours per week watching TV and/or DVD movies, and about one half an hour a week talking on his parents' cell and land-line phones. All other new ICTs were sporadic and were accessed minimally during the study.

Unlike all of the other 5-year-olds in this study, Mark had a younger sister who, like most 3-year-olds, was still learning how to take turns. There were many videos of Mark having to take his concentration off the screen to remove Elly's hand from the keyboard or tell her to stop touching the mouse. Usually this ended up with Sharon stepping in to help rescue Mark, or teach Elly how to take turns, and/or to teach Mark how to share the computer with his sister.

The two home computers Mark used were connected to high speed Internet access. Sharon and Alex purchased their high speed Internet access for her and her husband's work and because "communication, emails, all of our banking is online, we don't use a telephone book, if we are looking something up its always online". (C1Q9) Sharon also indicated that this Internet service was not purchased just for Mark's and Elly's use alone. If Sharon and her husband did not need the high speed Internet access for their work then,

I would use public computers. Mark got into the computer when we were living in Minneapolis because the library there had probably 15 and they had all their CD-ROMs online (.) so he would learn how to turn on stories and pick icons of whatever story he wanted to listen to, and they had headphones. (C1Q9)

#### **4.1.4 Fletcher family**

The Fletchers were the family containing the fewest number of subjects. Marika and Nick lived in a 1980's single level two bedroom apartment located on a university campus within a 10 minute drive away from Nick's bilingual school. Nick did not attend Sanderson elementary, but he did attend a similar public elementary school located within a similar socioeconomic neighborhood only two kilometers away. Marika and Nick's father, Ralf, were separated during this study and although Nick spent a great deal of time with his father, his father did not participate in the study.

Nick was another energetic boy who played soccer and hockey, and liked having friends over for 'play-dates', visiting family, and hiking with his mother and friends. He also collected and traded Pokémon cards, baked with his mother, and loved to draw, color and paint. Nick's drawings and paintings were often affixed to the Fletcher's apartment door bringing a splash of color and creativity into their long quiet blue-and-white-striped apartment hallway.

Of all the 5-year-olds, Nick had access to the fewest number of new home ICTs. However, Nick was allowed to access and could independently use all of the ICTs in his home. His favourite ICT was his family's laptop as it allowed him to access and play all of his favourite CD-ROM computer games (e.g., *Shelly the Snail* and *Freddy the Fish*). Marika noted that Nick became interested in using a computer when he was 4-and-one-half-years-old, and she estimated that he used the computer an average of 6 hours a week (with peaks up to 9 hours a week). Additionally, she noted that Nick used the DVD player to watch movies for about 6 hours a week, they both had the music playing in the background for an average of 6 hours a week, and Nick used the cell phone for five to 10 minutes a week to either take pictures and/or talk briefly to his grandma and father.

Marika worked full time as a forensic economist and coordinated with Ralf in the shuttling of Nick to his various sporting events, birthday parties, and social events. The researcher recalls Marika mentioning just prior to the third interview before that Nick had a better social life than she did! Truly Nick was a very socially active child, and did not fit any stereotype of a self-centered 'only child' with few friends or social skills.

Marika and Nick were the only family that did not have high speed Internet access. Marika accessed a high speed Internet service at her work and did not feel it was necessary at home yet because Nick was still very engaged with the CD-ROM games borrowed from the public library, and he had not yet demonstrated to Marika an eagerness to access and play the online games that some of his friends were playing.

#### ***4.1.5 Takashi family***

The Takeshi family lived in a 1960's single detached home on a tree-lined street about eight blocks away from Sanderson Elementary. Sena was the 5-year-old participant selected for this study and had a very close relationship with her grade four sister Hope and her parents Meri and Kevin. A great deal of Kevin and Meri's time was spent maintaining their very successful hair salon business.

Sena and Hope both attended Sanderson Elementary School. Sena attended the out of school daycare part time so the researcher was able to observe her during his volunteer work. Sena enjoyed playing in the daycare's dress up corner and joining up with a partner to play with the daycare's computer games. Many times she chose to sit quietly with a friend or two on the daycare's couch reading picture books. She always seemed to be smiling or laughing and was very aware of the needs of others around herself. For example, she often helped the researcher move some of the daycare's rolling furniture out of the way in the mornings after snack.

Sena's father, Kevin, indicated that Sena and Hope had access to, and used, all but two of their family's home-based ICTs . The only exceptions were his and Meri's iPod MP3 players and the Palm Pilot functions on his Palm Pilot (although Sena and Hope had used the Palm Pilot's cell phone features). When asked if they were independent at using these ICTs Kevin replied,

Yes they know with the camera, they know how to turn it on and focus and take photos, but again with the digital cameras now its so easy you're not actually focusing you're just doing the zoom function (.) the video camera function needs some supervision because it's a little complicated to use. So, as far as supervision, would they be videotaping the wrong thing? No. The one with the computer (.) at first I thought maybe they do ((need supervision)), but, now I don't. When they first went on the computer I was in the room wanting to watch every little thing, now I don't watch them at all. (S1Q3c)

Kevin also indicated that, on average, each week Sena listened to 4 hours of CD-ROM music, and played on the computer for 3 hours a week. Much of her computer time was spent playing the CD-ROM game *Pet Store* (which had an online element to it) and accessing online computer games found on Webkinz.com and Pbs.org. Kevin also indicated that Sena watched an average of 4 hours of TV a week, with some of this TV viewing being dedicated to Japanese TV which Kevin judged to be helpful at maintaining his daughter's Japanese linguistic abilities.

The computer that Sena and Hope used during the study had high speed Internet access. This access was purchased before Sena and Hope were born and was used for their family business, to assist Kevin and Meri in searches for information (like telephone numbers), to communicate with family living in L.A. and Japan, and to allow Kevin to play the occasional online game with his friends.

Table 6

## Average Time Participants Spent Using New ICTs Per Week

Type of ICT	Average hours and minutes per week
Desktop/Laptop Computer	4 hrs, 6 min
DVD Player	3 hrs, 12 min
TV (TV shows)*	3 hrs, 12 min
CD-ROM Player	2 hrs, 36 min
Cell Phone	8 min
Nintendo DS	6 min
Sonos Music System	5 min
Palm Pilot/ Blackberry	1 ½ min
Digital Video Recorder	0 min**
Digital Camera	0 min**
iPod Classic	0 min**
iPod Shuffle	0 min**
Karaoke Player	0 min**
All ICTs	13 hrs, 27½ min

\* Although subjects viewed both old (cathode ray) and new (Liquid Crystal Display/Plasma) TV technologies, all TVs were included as 'new' ICTs because all families had these sets interfacing with new ICTs such as DVD/Blue Ray players, digital sound systems, and so on.

\*\* Although one or more participants had these ICTs at home, they were accessed so infrequently during this study that the average time for the group was close to zero minutes.

The presentation of the synthesis of each family's individual set of descriptive data begins to underscore the uniqueness of the social and physical contexts in which each of these 5-year-old participants learned to use new ICTs. For example, participants were growing up in different housing configurations (e.g., a tight but well designed three level town-home compared to a solid and spacious single-detached English arts and crafts heritage-style home), different family configurations (only child versus one of three siblings), and with differing access to new ICTs (one participant had access to almost three times as many different types of new ICTs as another, see Table 6).

On the other hand these data also begin to uncover some similarities in the social and physical home contexts (e.g., all children had access to computers, DVD/CD-ROM Players, and TVs; all children lived in middle class homes that provided access to seven or more different new ICTs; and all enjoyed playing video games such as those found on the *Freddy the Fish* CD-ROM and on Webkinz.com). The following section presents a more detailed look into these social and physical differences and similarities for the entire sample.

#### **4.1.6 All families**

The following section draws upon interview data, researcher's field notes, and video data to highlight data describing some of the many similarities and differences between subjects' social and physical contexts. Again, these have been presented to produce a multidimensional picture of the learners and their families and experiences.

Although there were many examples of similarities between descriptions of two or three families' social and physical contexts, one descriptive element common to all families was that all parents encouraged their 5-year-olds to independently access and use *all* of the families' new ICTs. 5-year-olds were encouraged to access, and did access, everything from their father's Palm Pilot to the family's DVD player. However, it

must also be noted that although all children were encouraged to independently access any and all of the family ICTs, this access did have some restrictions.

For example, all of the parents indicated that children only accessed these ICTs during the child's 'free time' (the time between the child's existing scheduled events such as school, hockey games, music practices, dinner, bedtime, birthday parties, and so on). Parents also noted that their children were required to request parental permission before using the new ICTs. The exceptions to this rule being that the child could independently access and use the family TV, family stereo system, and the child's own ICTs (often stored in the child's bedroom) such as CD-ROM players, karaoke machines, and Nintendo DS players.

According to the interview data, parents were similar in that they did not formally schedule their child's time using home-based new ICTs. However, all parents did indicate that they could 'sense' when the child was spending too much time on one or more technologies, and needed a change. Grace's mother stated this well,

I really think she ((Lily)) likes to play with her toys, and interact with us, and laugh and work things out, learn new passions, or play with her friends, so it is a balance, and I think she has that balance. I don't want her to come home and jump on the computer and stay there for 2 hours. That would be too much I think for that age. Although I think she could learn lots of things, but still I want her to play some other things. (L1Q10)

Kevin also supported an unstructured approach to Sena's use of new ICTs. When asked if he and Meri scheduled Sena's time with new ICTs he replied, "No we don't actually, and it's more of an internal monitoring, if we think they watch too much TV, or we think they've used the computer too much". (S1Q3)

Another manner in which the families were quite similar as a group was in the frequency with which the children used different types of new ICTs. For example, of the 13 and one half hours a week that parents reported their 5-year-old child used home-based ICTs, children were observed spending just over 13 hours, or 98%, of their total time, accessing and using only four of these technologies: (a) listening to digitally produced audio (2.6 hours/week); (b) watching/listening to DVD movies (3.2 hours/week); (c) watching televised programs (3.2 hours/week); and (d) using the family computer/s (4.1 hours/week). Except for the amount of time Sena was reported to use a Nintendo DS game, children were also very similar in that they were observed spending 2% of their time (or 1.8 hours a week) accessing and using iPods, Palm Pilots, Digital Cameras, Video Cameras, Blackberries, Nintendo DS video game players, and Karaoke players.

Nick's mother explained the reason why some ICTs interested Nick more than others,

He's using the cell phone to talk to Ralf or in the rare case he's trying to take a picture of something. The CD-ROM player, again, he just wants to listen to music. The DVD player he's interested in watching a particular movie. The laptop he wants to play computer games, and those are still his favourites of course. My observation is that the thing he enjoys the most he invests the most time in learning and that's where it doesn't matter what the learning curve is that's what he is going to spend the time strategizing about and figuring out because it gives him the most enjoyment and the most interaction. Whereas these other things [cell phones and digital cameras] where, ah, he's talking, after about like I said 60 seconds maybe even 2 minutes, he's fading. Especially when the person's not there. (F1Q2)

Another manner in which the data from these families were similar is that the bulk of the video recordings were of participants using the family's home computer(s). Even after the researcher repeatedly requested participants and their families try and videotape examples of other types of new ICTs in and around the home, only three non-computer related video recordings were submitted.

The lack of videotaping of children's use of ICTs, other than a computer, was largely due to three reasons. First, parents reported that using the computer was an activity that most children naturally enjoyed doing regularly every week and that it offered children a large number of on and offline games to play. Second, all of the families found the video cameras to be too bulky and cumbersome to use when trying to capture children's often highly spontaneous and sporadic use of portable ICTs such as digital cameras, cell phones, Nintendo DSs, karaoke players, and video cameras. And third, because their children often used the portable ICTs in variety of places inside and outside the home, it was difficult for the parents to get the video camera set up and start recording before the children moved on to another activity (Kevin, Sena's dad, noted their children used cell phones at the park (S1Q7) and the researcher recorded in his field notes seeing two children from this study using their parent's cell phone at school (TN2 18/12/2007; BN8 06/02/2008)). In short, most of the video collected in this study captured 5-year-olds using computers with friends and family because parents found their children's use of this ICT the easiest to videotape.

An analysis of the video also found that the most frequent activity 5-year-olds engaged in when using home-based ICTs was playing screen-based video games (see Table 7). An average of almost 83% of the children's observed time with ICTs was spent playing video games on Nintendo DSs, Blackberries, and family laptop and desktop computers (e.g., BV4.4 0:00-10:00; SV3.2 0:00-10:00; FV2.5 2:00-12:00). This value

Table 7

*Types of ICT Activities Participants Were Video-recorded Using, Expressed as Percent of Total Recorded Time*

Child	Type of Activity						
	Playing computer games (including Nintendo DS & cell phone)	Obtaining information (e.g., web search for information on animals)	Setting up soft/hard-ware (applying for new account, opening a program)	Sports (e.g., watching football and hockey highlights)	Writing (e.g., letters, email)	Learning to use cell phone or video recorder (not for games)	Listening to digital books or reading text-heavy online game pages
Chris	89.5%	-	7.4%	-	-	-	3.1%
Lily	70%	8.1%	9.7%	-	6.3%	3.4%	2.5%
Mark	78.5%	8.5%	10%	2%	-	-	1%
Nick	93.4%	-	4.6%	-	-	-	2%
Sena	83%	-	15.6%	-	-	-	1.4%
Average	82.88%	3.32%	9.46%	0.4%	1.26%	.68%	2%

would have been even higher if the researcher had included the time that parents and siblings spent helping the 5-year-olds search for and load in these video games (this video data was listed under “Setting up soft/hardware” column).

Children were also similar in that they were observed spending an average of 2% of their time using ICTs to listen to and/or observe digitally produced stories or instructions (e.g., SV3.11 5:10-8:50) and/or reading game pages with heavy text (e.g., BV2.5 6:06-8:30). They also all exhibited stretches of patience averaging almost 10% of their observed time waiting for programs to boot up, for parents to set them up on a website, for computers to finish crashing, for siblings to come show and/or explain them something, and for parents to help them key in the website’s address or conduct a search on Google.

There were many differences between the types and numbers of new ICTs that families used. One of the most striking differences could be seen in the very different variety of locations in the home that children accessed computers. Aside from the Takashi and Bronwell videotapes, children were seen using computers (and other ICTs, like phones and video cameras) in a variety of different rooms around the house. The Bronwell’s computer was always in the parent’s bedroom and the Takashi’s in their basement recreational room. Even when a family did videotape their children in the same room it was often with the child sitting or standing in a different place in the room. This was because most children were working on wireless laptops, cell phones and gaming units that were portable and could be used in a variety of locations. Additionally, children like Mark, Lily and Nick were most comfortable working near their mother (especially convenient when the child needed a question answered) thus the laptop and videotaping were often located in or near the same room as their mother.

Children and their families were also shown to be very different in the types of ICT-based activities with which they engaged. For example, both Lily and Mark were video recorded working with a parent searching for online information about topics of interest to the child, however Nick, Sena, and Chris were not. Furthermore, Mark was videotaped watching hockey highlights, whereas the others were not (although, Chris did talk about watching hockey highlights at home, and he reported looking at hockey scores with his dad using his dad's Blackberry phone).

Similarly, Lily was videotaped with her mother learning how to use the computer to write a letter to Santa and an email to a friend, yet no other children were filmed using these ICTs for these purposes. Finally, even though each child spent a great deal of time playing computer games, they were rarely videotaped playing the same games (with the two exceptions being Webkinz.com, or when the children were observed playing the same game together).

#### **4.2 Teachers**

During the first interview, the participants and their families were asked who, and/or what, they thought was likely the best person/people for teaching their 5-year-old child to use new home-based ICTs, and who and/or what they thought was actually responsible for teaching the 5-year-old how to use these technologies. In the second interview children were asked who they turned to when they wanted to learn how to do something, or needed a problem solved, when using new ICTs-especially when using the computer. In the fourth interview, parents were asked again who, and/or what, they thought were/was teaching their 5-year-old child to use their new home ICTs.

The interview transcripts of subjects' answers to these questions were analyzed to determine categories describing who was teaching the participants how to use new ICTs (see *Encoding Procedures and Data Analysis* in chapter 3 for coding

methodology). Next, the researcher's field notes and the video recordings were analyzed using a similar categorical qualitative data analysis process to gain further descriptive evidence that demonstrated who taught the participants *and* the relative amount of time each of these 'teachers' spent instructing the participants. Finally, the findings from all three data sources are presented by each individual family, and then described as a group.

#### **4.2.1 Bronwell family**

During the first interview, Chris' mother, Kate, maintained that the entire family was involved in teaching Chris to use new ICTs. However she also noted that a great deal of what Chris learned about new ICTs, especially computers, came from "just watching his sisters" (B1Q7). She added, however, that in Chris' preschool years she also played a large instructional role,

[Chris] has also always been much more interested than the girls have been [with new ICTs]. I guess when he was very little, I used to go onto that PBS kids site, and we looked at Clifford or just started off with the coloring and painting sheets. (B1Q7)

However, when it came to learning to use the DVD player or cell phone, Kate indicated that the person responsible for teaching Chris these skills was "probably more of his dad" (B1Q7). Furthermore, Kate also acknowledged that Chris' family members were not the only ones responsible for teaching Chris to use new ICTs. For example, when asked who taught Chris to use the computer, Kate replied,

His sisters and friends. I mean he has had friends over since preschool that have said how to spell Hot Wheels and I'll write it down. They know what the name of the site is, they just didn't know how to spell it. They go there and then I hear them say this is a cool game. So from his friends too. (B1Q7)

During the researcher's interview with Chris, he demonstrated several computer games he delighted in playing. As he spoke, the conversation presented several opportunities for the researcher to ask him who taught him these skills.

Researcher: It sounds like you send ((via email)) things via Webkinz?

Chris: I don't really know how.

Researcher: How did you do it then?

Chris: It wasn't really me it was his ((Chris' friend's)) sister that did it.

Researcher: So his sister, how old is she, and what grade is she in?

Chris: Grade three.

Researcher: So she is showing you how to do things?

Chris: Yes.

Researcher: Did she show you at his house or at your place?

Chris: At his house.

Researcher: Are you learning from other people? (4) Like older, like your sister?

((turning to Liza)) It sounds like you're learning from her, and you're learning from -

Chris: No I am not! (B2Q2)

Although adamant his sister was not teaching him how to use Webkinz, Chris noted later in the interview that when he ran into problems he turned to his mom, dad and sisters for help. However, Chris's 7-year-old sister, Liza, also noted that she turned to Chris for help in certain computer games "because sometimes [Chris] has played those games before and I don't know what to do". (B2Q5)

Both Chris and Liza also acknowledged that the computer itself played a role in 'teaching' them to learn how to use it,

Chris: I learn how to play games by myself sometimes. If it has the words to tell you, like, (1) I don't read it so I just go on and then I just find out what to do.

Researcher: So you click on things?

Liza: Yep and sometimes the computer tells you what to do. It talks! (B2Q5)

However, Chris and Liza had different experiences when it came to who taught them how to use the computer in school,

Researcher: So does your teacher teach you how to use Webkinz?

Liza: No.

Researcher: Has your teacher taught you something that helps you when you're on the computer?

Chris: No. Our teachers don't teach us anything about computers.

Liza: Yeah they do, mine does.

Chris: Mine doesn't. (B2Q3)

An analysis of the Bronwell's home video found that indeed the whole family did teach Chris how to use their home computer software and hardware at one point or another. For example, Chris' father helped Chris learn how to use a Blackberry phone (BV4.10 0:00-3:59), his mother helped him login to new websites (BV4.1 0:00-3:49), his older sister showed him how to play an online games (BV1.7 0:00-3:00), and Liza often sat beside Chris suggesting ways to beat her grade two games (BV1.13 16:05-22:11).

However, family were not the only people teaching Chris how to use new home-based ICTs. Chris was also videotaped playing online video games with, and receiving help from, Mark, another 5-year-old participant in this study (CV1.6 0:00-5:50). Similarly, Chris indicated that he learned to play some online computer games when visiting friends and their older siblings. (C2Q2)

Analysis of the Bronwell's interviews indicated that there were four groups of people responsible for teaching Chris how to use the family's computer hardware and software, or online software that was played on his family's hardware. These included his parents, siblings, friends, and his friend's siblings (see Figure 5). Chris also noted that he

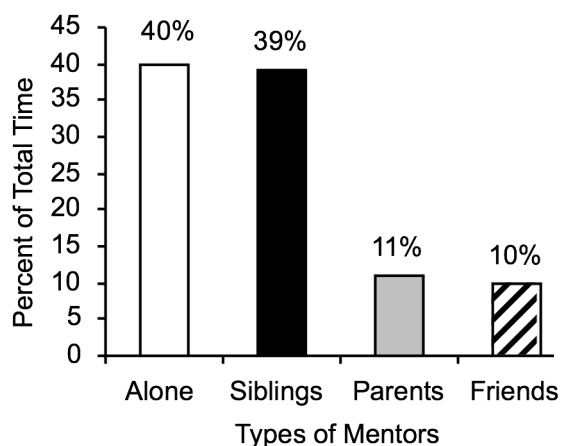


Figure 5. Distribution of time Chris spent with mentors learning to use, and using, new ICTs<sup>4</sup>.

sometimes taught himself and sometimes the computer taught him. Furthermore, a review of the Bronwell's video supported these findings with 40% of Chris' observed time being spent learning from and with his sisters, 11% of his observed time learning from/with parents, 10% of his observed time learning from/with friends, and 40% of his

<sup>4</sup> The percentages for this pie chart (and all subsequent pie charts in this chapter representing the time a child spent alone or with friends or family using new ICTs) were derived from a minute by minute analysis of the family's video. These percentages were then presented to the parents to determine if these estimates would be representative for their child's use of ICTs in general (recall much of the video in this study involved children's use of computers). For all but one family, the 'friends' pie chart slice were increased by 2% to 5%, and the parents slice decreased by the same amount, so as to reflect the child's gathering independence away from parents during this study and the increasing time that the researcher and the parents observed the child spending with his/her friends using new ICTs in daycare, on the school grounds, and during visits to their friends' homes.

observed time learning alone. There were no videotaped instances of Chris learning from his friend's siblings as they were not participants in the study.

Occasionally it was difficult to determine exactly if and when members of each of these groups were teaching Chris. For example, sometimes the researcher could not see the screen to determine how these groups were using the mouse to visually demonstrate to Chris how to solve a game's challenge). However, the researcher could observe the subjects' gestures and verbal exchanges, and hear auditory feedback from the participants and the computer screen, which indicated the amount of time each of these groups spent teaching or helping Chris was proportional to the time they spent sitting or standing beside him.

Finally, it is important to reiterate that video demonstrated that Chris spent 40% of his observed time playing games 'alone' (on his own and without any assistance from anyone) and that he seemed to be using visual and auditory clues from the technologies when teaching himself how to play certain parts of some games (this will be discussed in more depth in chapter 5). This brings credence to Chris' comment that, "I learn how to play games by myself sometimes", and Liza's comment that "sometimes the computer can tell you what to do" (B2Q5).

#### ***4.2.2 Siperco family***

Unlike Chris, Lily did not have any siblings to teach her how to use her family's computer. However, when the researcher asked the Siperco's where Lily learned how to use a computer and from whom, Grace responded,

Grace: I think at Clandestine Daycare ((Lily's preschool daycare)). I don't know what the teachers taught them there, but they have got a computer and she learned to play several games there.

Researcher: Yes.

Grace: And I think many of the kids taught her, and I don't know how much the teachers taught her.

Researcher: Yes.

Grace: Because she learned to play the *Magic School Bus* from there, and *Freddie the Fish*, and (to Lily) what else did you learn at Clandestine?

Lily: Mmmm, *Magic School Bus* and *Freddie* and *Magic School Bus* and *Barney*.

Grace: Who taught you to play those there? (2)

Researcher: And who taught you the rules to go on to the computer?

Lily: Mostly the kids. (S1Q7)

Later in this conversation Lily also noted that “it was the daycare workers’ job to tell children when to get on or off the computer” (S1Q7). Along with her daycare friends teaching her how to use a computer, Grace also indicated that Lily learned to use the computer by either visiting her friends and playing on their computers, or when Lily’s friends came for a visit and played with Lily on the Siperco’s computer (S1Q7).

When asked who was ‘best suited’ to teaching Lily to use new home-based ICTs, Lily’s father quickly stated, “her mom” (S1Q7). This was borne out in the analysis of the video which found Lily spent 53% of her observed time learning how to use new ICTs from her mother. Even when Lily was working on her own, the laptop was moved to the room in close proximity to her parents so Lily could request Grace’s help when necessary. Mikkel added that this was because “[I have] a feeling at this age that they don’t want to be alone, or they don't *like* to be alone”. (S1Q2)

When I asked Lily if her current kindercare daycare workers (not her preschool workers) or teachers taught her how to use a computer, she responded in a similar manner as Chris:

Lily: At kindercare ((the after-school care Lily attended during the study)) they don't have a computer.

Grace: How about kindergarten?

Lily: I can't use the computers at kindergarten.

Grace: ((In a surprised tone)) You can't use them?

Lily: Not really.

Grace: ((In a surprised tone)) How not, why not?

Lily: Because I'm not taught yet.

Grace: Oh... (S1Q7)

Unlike Chris, Lily did not have access to computers in her daycare, but similar to Chris, Lily's kindergarten teacher had not yet allowed Lily access to the school's computers.

Finally, an analysis of the Siperco's video corroborated much of the information Lily and her parents presented in their interviews. That is, the instruction Lily received on how to use new ICTs largely came from her parents (in this case Grace, e.g., SV1.1 0:52-10:52), and working alone being the least frequent category from which Lily learned how to use new ICTs (e.g., SV3.5 0:00-4:27). Video of Lily learning to use new ICTs from her friends did not exist as these children were not participants in the study. However, the role friends played in teaching Lily how to use new ICTs was supported by two of the researcher's field notes in which he recorded Lily talking about learning to access and play Webkinz.com video games from a friend while using the Siperco's family laptop (SN5 13\_12\_2007; SN9 05/02/2008).

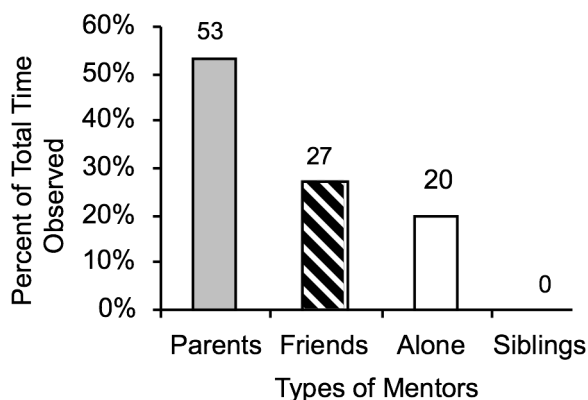


Figure 6. Distribution of time Lily spent with mentors learning to use, and using, new ICTs.

#### 4.2.3 Canford family

During the first interview, both Mark and his mother, Sharon, were asked to verbally list the people who taught Mark to use new ICTs. Sharon answered “I would say me because I am the one that is mostly around”. Mark, on the other hand, crossed his arms in front of himself and stated very succinctly, “anybody except my baby sister”. Mark also noted, that his father helped him out as well but that his “mom did more and dad less “cause she knows all about cameras and computers”. (C1Q7)

During the same interview, Sharon and Mark noted that Mark also learned how to use new ICTs, especially computer games, from friends when visiting their homes.

Sharon: But if we are at someone else’s house...((turning to Mark)) like Dan who showed you how to use the Hot Wheels website, right?

Mark: Mmmm ((nodding head in affirmation)).

Sharon: ((to researcher)) So it ((the friend that teaches Mark)) depends on whose house we are at. (C1Q7)

The first interview revealed findings similar to Lily's and Chris' about the role school educators played in teaching Mark how to use new ICTs. The researcher had just finished listing the places people learn to use the computer when this conversation occurred,

Researcher: Where is the best place for you to learn to use the computer?

Mark: At home

Researcher: At home, why do you think it is at home? Why not at the library?

Mark: Because I never have any questions to learn at the library.

Researcher: So you do most of your asking, like what is an aardvark, at home?

Not at the library. And at school? Do you have any questions you go to the computer for?

Mark: No, I only play computer games.

Researcher: Do you have a computer in your classroom?

Mark: Nope. (C1Q7)

Later in the interview when the researcher asked Mark if he ever got to use the computers at school he also said, "No". (C1Q10)

The analysis of the video data substantiated Mark and Sharon's interview data. For example, almost 50% of the Canford's video captured Mark's parents helping Mark use the computer to, for example, play video games (CV1.2 0:00-2:50; CV3.3 22:23-23:35), engage in art and crafts projects like building paper snowflakes from online instructions (CV2.3 21:36-23:35), look up information and answer questions (CV1.4 1:35-6:50, CV1.5 5:17-15:54), instruct him how to share the computer with his little sister Elly (CV2.3 0:00-1:20, CV3.3 16:25-17:15), and teach him how to use computers and troubleshoot hardware and software problems (CV2.1 21:13-23:35, CV1.2 0:00-0:225).

The Canford's also submitted three video disks that captured Mark working with Chris Bronwell as they taught each other how to play online video games (e.g., CV2.7 0:00-7:00, CV3.2 4:42-23:35, CV3.4 0:00-6:50). In fact, 13% of Mark's video recorded him and Chris teaching each other how to play new online video games. This finding was corroborated by two of the researcher's field notes (CN4 01/21/2008 and CN4 02/20/2008) in which the researcher noted that Mark spent 15 to 30 minutes a morning before school either learning from peers, or teaching peers, how to play the daycare's video games.

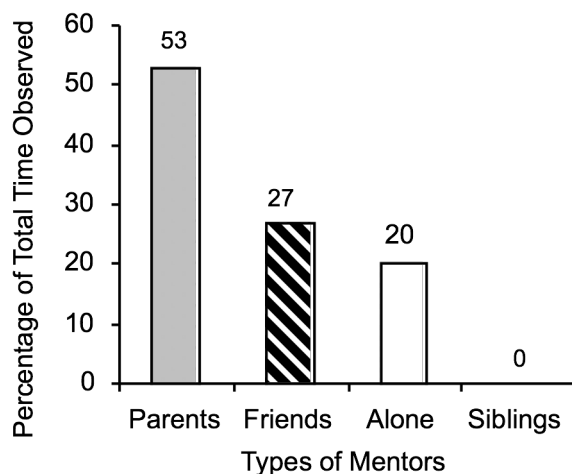


Figure 7. Distribution of time Mark spent with mentors learning to use, and using, new ICTs.

Unlike Chris and Lily, there was no indication from Mark or his mother during the interviews that the new ICT (largely the computer) played a role in teaching Mark how to use the new ICTs (See Figure 7). An analysis of the video indicated that for 30% of the

time he was observed, Mark worked alone on the computer and did not ask or receive help from anyone. However for much of these times alone, the video captured Mark listening to auditory prompts and viewing visual prompts that gave him enough comprehensible input to be able to continue independently with the game he was playing (e.g., CV2.6 0:27-3:52).

Finally, during the interview, Mark was adamant that he did not learn from his younger, 3-year-old sister, Elly (C1Q7). However, an analysis of the Canford's video recordings found Mark spent 6% of his time using the computer with Elly standing beside him either looking at what Mark was doing on the computer or trying to use the hardware the same time Mark was using it (e.g., CV2.3 0:00-2:00). Although she was much too young to teach Mark directly how to use the computer software and hardware, her random pounding of the keys, her attempts to wrestle control of the mouse and mouse-pad away from Mark, and her desire to watch Mark play his games (and obstruct Mark's views of the computer screen), helped teach Mark how to negotiate and work with a toddler who was just as eager as he was to learn how to play computer video games.

#### ***4.2.4 Fletcher family***

In our first interview, the researcher asked Nick's mother, Marika, who she thought was responsible for teaching Nick to use the computer and she stated "Basically that would be Ralf or myself, but mostly myself because I don't see Ralf around technology that much" (F1Q7). However, because Ralf was not a consenting participant in this study, the data outlining Nick's engagement with Ralf's home technologies were not available.

Marika also noted that Nick learned a great deal about computers by watching other children at Nick's daycare. She stated,

When Nick was at the University daycare, Justin [Nick's friend] was more computer savvy and Nick would ask Justin to come with him when he had to turn on the computer. Nick would just observe, so he wasn't actively taking part in it because he just didn't seem to embrace it or it was new to him or he didn't feel ready to take the risk. It's my distinct impression that other than how to maybe initially get the programs up and running, the kids watch one another. So I would say they are essentially teaching one another. (F1Q7)

Similarly, when asked who she thought was the best suited to teach Nick how to use the computer Marika answered,

I think his peers, his age peers. He seems to understand that these are his peers and he watches the strategies they employ. I mean I am not inside Nick's head but in watching his friends he seems to be more comfortable with the fact that they can achieve it so therefore he can. (F1Q7)

During the first interview, Marika also noted that Nick spent a great deal of time playing with new ICTs and figuring them out on his own. She noted that in many cases the video games he played were designed to teach him as he progressed through the levels. She stated,

We have a couple of computer programs that Nick can play, and he really enjoys it. The *Freddy the Fish* one is very much geared to them [the children] planning ahead and using strategies which I think is a good idea. There is a lot of funny little jokes built into it and there are lots of little strategies and [unintelligible] built into it. So already he's taking cues of what to do and it's just teaching him to, as I said, plan ahead and use strategies and to remember certain codes and colours and systems to guide him through different mazes. (C1Q7)

An analysis of the Fletcher's video confirmed Marika's belief that Nick learned a great deal about using new ICTs from Marika herself, and from the programs themselves (see Figure 8). In fact, 20% of the Fletcher's video found Nick working one-on-one with his mother in learning how to use computer software, and 50% of the time Nick was working alone using audio prompts, hints and instructions to navigate and learn how to play video games.

However, video recorded data could not substantiate Marika's claim that Nick spent 27% of his time learning how to use new ICTs (especially how to use computers) from his peers as these children were not participants in the study. Additionally the researcher did not have the opportunity to observe Nick learning to use new ICTs alongside his friends in his home or during his time in daycare.

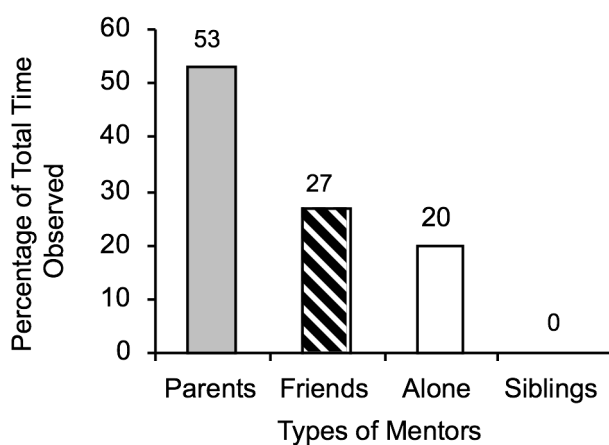


Figure 8. Distribution of time Nick spent with mentors learning to use, and using, new ICTs.

#### **4.2.5 Takashi family**

When asked, "Who teaches Sena to use their home ICTs?", Sena's father, Kevin, indicated that "I think a lot of times it happens with my wife or I." He then explained to

the researcher how this teaching and learning happened between Sena and himself and/or his wife Meri, and then he added, “And I think a lot of the times they learn from school, and a lot of times from their parents, but a lot of the times from their peers”.

(S1Q7)

When the researcher asked Sena and Hope in the second interview who taught them to use new equipment in their home, like the phone and computer, they very quickly replied,

Sena: My sister

Hope: My dad when I was smaller.

Researcher: Does your dad or mom teach you Sena?

Sena: Yeah, and my sister.

Researcher: Mostly your sister or mostly your dad?

Sena: Mostly my sister.

Hope: And mostly my dad because my sister can't tell me. (S2Q4)

Also during the interviews, none of the Takashis indicated that new ICTs themselves could “teach” Sena how to use the new ICTs. Furthermore, Kevin indicated that Sena’s kindergarten teacher had not yet taught Sena how to use new technologies like the computer. This did not surprise Kevin though, as he remembered Hope’s teachers not using computers until the first grade (T1Q10).

An analysis of the Takashi’s video did indeed confirm that Sena’s father and older sister were largely responsible for teaching Sena to use the family’s computer and Nintendo DS hardware and software (see Figure 9). However, Sena’s mother, Meri, was never heard or seen in any of the video recordings.

Sena was video recorded working on new ICTs for 6% of the total recorded time. This paralleled the interview data in which the family did not mention the role (or

possible role) that new ICT software could play in helping Sena learn how to use, for example, online games.

Also during the first interview, Kevin estimated that only 5% of Sena's time using new ICTs was spent learning from friends. This was corroborated by the researcher's field notes where, for the entire time the researcher volunteered at the Sanderson daycare, he only observed Sena sit down three times with peers at the computer (TN1 4/12/2007; TN4 15/1/2008; TN5 24/1/2008). Additionally, in all three cases, she was observed to be content to sit off to the side, not touch the mouse, and watch her Sanderson Daycare peers play and/or learn how to play a Little Mermaid video game.

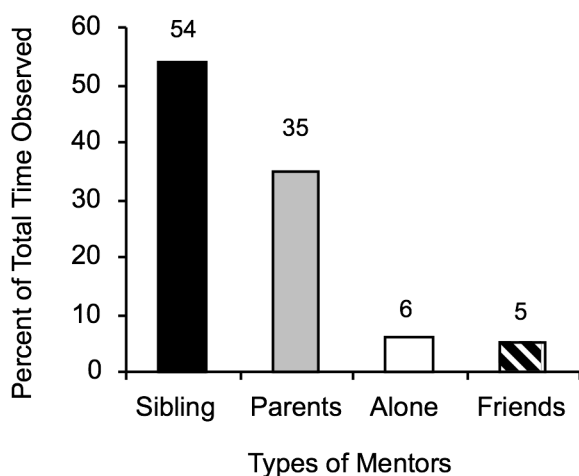


Figure 9. Distribution of time Sena spent with mentors learning to use, and using, new ICTs.

#### **4.2.6 All families**

As a whole, the 5-year-old participants were learning their computing skills, knowledge and attitudes largely from four main groups: their parents, friends, siblings, and the software itself (the role of computer software and hardware will be discussed in greater detail in the next two chapters). In all but Nick's and Lily's cases (both 'only

children'), the video demonstrated that participants often drew upon several of these groups at the same time when trying to, for example, figure out a problem (TV3.13 3:50-4:50), play a game (BV4.8 0:00-6:38), read text on the screen (TV2.1 42:13- 42:39), or learn how to install and use the software or hardware (TV3.6 4:15-7:03). Furthermore, when any people entered into the room, and the participant was having difficulty (in most cases difficulty with a computer game), the participant would immediately press the person/people for an answer or help. Additionally, the participant requested assistance regardless if the person knew the answer (e.g., SV4.5 7:42-9:45). In short, when learning to use new ICTs at home, all participants were observed to repeatedly draw upon information offered by their computer software, and the experience and knowledge of any available parent, friends or sibling.

Another observed trait common to four of the five families was that participants who had older siblings were more likely to turn to an older sibling for help than a parent (see Table 8). Furthermore the more older siblings there were, the less likely it was that the participant would turn to a parent. For example, Chris had two older siblings and of the total time they were observed turning to others for assistance, direction and instruction, he was observed turning to his parents only 11% of the time, whereas Sena had one older sibling and was observed turning to her parents 35% of the time. Mark did not have an older sibling and was observed turning to his parents 49% of the time. Similarly, Lily had no siblings at all and she was observed turning to her parents 53% of the time. Like Lily, Nick was an only child and *the* only child who seemed not to follow this trend. He turned to his mother for assistance in figuring out challenging game problems only 20% of the time. However, a possible explanation for why Nick did not turn to his mother as frequently for assistance may have been because he was often

videotaped playing familiar CD-ROM games for which he knew the majority of navigation and problem solving strategies.

Table 8

Percentage of Time Participants were Observed Working with Parents, Siblings, Friends, and Alone While Learning to Use a Computer During the Study

Child	Person who taught participant to use computer			
	Parent	Sibling	Friend	Alone
Chris	11%	39%	10%	40%
Lily	53%	-	27%	20%
Mark	49%	6%	13%	32%
Nick	20%	-	27%	53%
Sena	35%	54%	5%	6%
Average	33.6%	19.8%*	16.4%	30.2%

\* Lily and Nick did not have siblings. The average for the three participants with siblings was 33%.

Not only did Lily and Nick not have siblings, but the researcher noted that their parents scheduled frequent visits, or play-dates, with Lily's and Nick's friends. Nick's and Lily's parents also scheduled regular visits to local playgrounds so they could play with other children (FN1 11/12/2007, SN4 13/12/2007). This was corroborated by the parents' interview data which indicated that Lily and Nick chose to spend more time using a computer and/or learning how to use a computer with their friends (average of

27% of the total time per participant), than those participants who had siblings (average just over 9% of the total time per participant).

Although there are some similarities in the observations with whom participants turned to when using/learning to use new ICTs, there was a far greater number of differences. For example, and as listed in Table 8, Lily was observed spending 53% of her total time learning from her parents, whereas Chris spent only 11% of his time learning from parents. Nick spent 53% of his observed time learning alone, whereas Sena spent only 6% of her observed time working and learning alone. Additionally, Lily spent almost 30% of her observed time working with friends, whereas Sena only spent 5% of her time with a friend. Furthermore, the two 'only-children' were quite different from each other, with Lily spending far more time working with her parents than did Nick, and Nick spending much more time working alone than did Lily.

Finally, all the participants in this study had one other commonality that they shared regarding who *didn't* teach them how to use new ICTs. None of their teachers had taught them how to use the school's computers by the time the study ended on March 18, 2008 - almost two thirds of the way through their first year of school.

#### **4.3 Chapter Summary and Chapter 5 Preview**

This chapter presented descriptive data relevant to this study's first question, "What home teaching/learning contexts exist for 5-year-olds learning to use new ICTs"? Findings indicated that: (a) parents encouraged their children to independently access and learn to use a wide variety of new ICTs during the child's free time; (b) participants spent the majority of their time accessing and learning to use four main new ICTs (DVDs, CD-ROMs, TV, and computers connected to high speed Internet); and (c) when families were compared and contrasted, participants learned to use new ICTs in both different and similar social and physical contexts (e.g., different - small family versus

large family; similar - the majority of participants spent time playing and/or learning to play video games).

Chapter 5 presents the findings for this study's third research question: What teaching and learning principles are characteristic of the actions or participants and interactions between subjects? An analysis of interview data, video recordings, researcher's field notes finds and presents 16 different, but closely connected, teaching and/or learning principles.

## Chapter 5: Findings – Principles of Teaching and Learning

### **5.0 Introduction**

This chapter presents further layered, rich, contextualized findings that describe how 5-year-old children in this study come to learn to use new ICTs and develop new literacies in the home setting. More specifically, this chapter presents descriptive findings that answer the third research question, “What learning and/or teaching principles are demonstrated when family members and friends directly or indirectly teach primary-aged family members to use new ICTs in the home setting”?

For this question, all interview transcriptions were reviewed for any indication of a subject’s reporting on a teaching and learning principle, and these were sorted into descriptive teaching and learning categories (see *Encoding Procedures and Data Analysis* in chapter 3 for coding methodology). Next, the researcher’s field notes and the video recordings were analyzed using a similar categorical qualitative data analysis process to gain further descriptive evidence of teaching and learning principles occurring when the child worked alone or with family or friends in the home context. Finally, 16 teaching and learning categories were identified and are presented.

### **5.1 Principles of Teaching and Learning**

Findings for this study’s third question were developed from the categorical qualitative data analysis of the interview transcripts, researcher’s field notes, and subjects’ videotapes (see chapter 3, *Encoding Procedures and Data Analysis*). Categories containing data slices that provided descriptive insights into the third research question were chosen using the three following selection criteria: (a) the category must contain data slices indicative of learning and teaching principles related to participants’ uptake of new home ICTs; (b) the data slices must be common across

three or more family's data sets; and (c) the category must contain 11 or more data slices<sup>5</sup>. A total of 16 categories of teaching and learning principles were identified and are listed in Table 9. Each of the top 10 most frequently mentioned and observed teaching/learning principles contained between 20 to 47 data slices, and are described in detail in the following paragraphs. The remaining seven principles contained 16 or fewer data slices, and are described in less detail<sup>6</sup>.

### ***5.1.1 Principle #1: Mentors and modeling***

The 'Mentors and Modeling' teaching and learning principle received the greatest number of data slices out of all categories in this study. Of the 47 data slices that fell into this category, 45 arose from the analysis of interview transcriptions and video recordings. The interview data slices described how the participant's family (largely parents) believed mentors<sup>7</sup> played a key role in modeling<sup>8</sup> to participants how to use new ICTs, and how these mentors went about modeling the strategies required to help the participants use new ICT software/hardware. Additionally, the videos demonstrated who actually mentored the participants and how.

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<sup>5</sup> Categories containing less than 11 teaching and learning principle data slices were omitted from this study for three reasons. First, many of these categories were not observed across three or more families. Second, the reduced number of data slices made it difficult to describe and discuss the principle in any depth. And third, many of these principles arose in the interviews with parents, but were not identifiable in the video (or vice versa), making it difficult to build reliability and credibility in data analysis.

<sup>6</sup> Categories of teaching and learning principles that contained 16 or fewer data slices often did not appear across data sets (interviews, field notes and video), nor did they appear across all families, thus the descriptions and discussions around these principles have not been presented in detail in this study.

<sup>7</sup> In this study, a mentor is defined as someone who is more capable at using new ICT software and hardware than the participant, and who is willing to stop and spend the time to demonstrate and explain to the participant how to use new ICT software and/or hardware.

<sup>8</sup> In this case modeling was defined as "the process in which observers [participants] display new behaviours that they could not perform prior to being exposed to the models" (Schunk & Zimmerman, 2007, p 11).

Table 9

Sixteen Teaching and Learning Principles. Ranked by Total Number of Interview, Videotape, and Field Note Data Slices.

Teaching/Learning Principle Category	Data Slice Frequencies			
	Interviews	Field Notes	Video	Total
1. Mentors and Modeling	19	2	26	47
2. Child Initiated & Controlled Learning	23	0	23	46
3. Just-in-time Learning & Teaching	18	2	24	44
4. Observational Learning	19	1	18	38
5. Play-based (Game-based)	7	1	26	34
6. Unstructured & Spontaneous Learning	17	1	15	33
7. Multimodal Learning/Teaching	9	3	17	29
8. Help Child Become Independent User	11	1	14	26
9. Discourse Group/Highly Social Activity	14	0	11	25
10. Seamless & Unconscious Integration	10	0	10	20
11. Comfortable with Change	10	2	4	16
12. Open Access	7	0	6	13
13. Critical Literacy	9	0	4	13
14. Portable and Distributed	6	0	6	12
15. Meaningful & Contextual	5	1	6	12
16. Kinesthetic and Musical Learning	1	1	9	11

During the interviews, all of the parents indicated that their 5-year-old's early uptake of new ICTs began with the parents modeling to the participant the procedures for using specific ICTs. Parents often used phrases such as "I demonstrated" or "we showed them" when explaining and describing this parental modeling process, and often these expressions preceded the parent demonstrating to the 5-year-old participant the required procedures and knowledge for using new ICTs.

For example, Kate recalled that Chris demonstrated a keen interest in playing with computers between 3- and 4-years-of-age, so she "started showing him one or two kids-base websites, and then he just seemed to go so quickly from there" (C1Q7). Sena's father noted how this modeling occurred for Sena and Hope with "...my wife or I, the parent, showing them once or however many times" (S1Q7).

Nick's mother said that once she started bringing the computer home from work, "then I showed [Nick] the *Freddy the Fish* game right away" and "occasionally we would go to an Internet café and sit and play, and that was with me showing him how to move through things". Grace's mother also noted that she needed to do a lot of modeling when first teaching Lily how to write using the computer,

I think in the beginning, because she didn't know too much, I showed her how to make the letters bigger, color it, how to change it, how to change the font or I don't know, or whatever, make it bold, and then she does it without asking. And she asks me, she started to ask me about the buttons on the menu what do they do, what can we do with those, or she simply presses a button and something changes and then she asks me what happened and then I explain to her, so I let her try. If she wants. (S1Q5)

When the 5-year-olds were asked who they thought were responsible for teaching them to use the computer and how, they often indicated that their parents,

friends and siblings (or combinations thereof) were their 'teachers' (or mentors) and that these people were largely responsible for showing them (mentoring them on) how to use the ICT software and hardware. For example, during an interview between Nick and the researcher, Nick decided to demonstrate and explain to the researcher, how to solve a colour matching puzzle in his favourite CD-ROM adventure game, *Freddy the Fish*. After sequentially clicking on four coloured panels and making a matched pair of images, the researcher asked Nick "So, you figured [how to do] that out on your own, or did your mom help you figure it out?" And Nick responded, "She showed me the first time, and then every time I did it" (F2Q3).

A similar situation highlighting the important mentoring and modeling role that parents regularly played for the participants in this study arose during one of the researcher's interviews with Mark. Part way through the interview Mark decided to show the researcher how to login to hotwheels.com and play some video games he liked. While he was independently typing in the website address the researcher asked Mark if his mother or father taught Mark how to write on the computer and how to type the website addresses. He answered, "No, they just tell me and show me what letters to push" (B2Q2).

The importance of parental modeling of "what letters to push" was highlighted and reinforced when the researcher interviewed Chris. As the interview progressed, Chris decided to show the researcher a game on clubpenguin.com. Unfortunately he had difficulty typing in the website address, so he turned to his mother and said, "Mommy can you spell it for me"? Kate then spelled out the word orally while Chris's youngest sister, Liza, pointed out (modeled) which letters on the keyboard that Chris needed to type (B2Q6; BN8 16/01/2008).

In this case, not only was Chris' mother responsible for mentoring and modeling Chris into the world of computer-mediated writing, but his older sister also took on a mentoring role. Nor was this the only example of a sibling taking on a mentoring role. For example, more than half of the Takashi video captured Sena's older sister, Hope, modeling to Sena how to use the Takashi's computer software and hardware (TV2.2 8:07-9:35) and Nintendo DS game system (TV4.6 0:00-4:50).

Even Mark, who had no older siblings, demonstrated the important mentoring and modeling role he played as an older sibling in teaching (albeit often inadvertently) his 3-year-old sibling some finer points of using new ICT software and hardware. For example, video (CV2.3 0:00-1:21) captured Mark modeling how to use the laptop mouse to Elly his 3-year-old sister. Mark moves the mouse pad and Elly sees something happen on the screen that she likes (the laptop is on the floor and turned at such an angle that we can not see the program). Elly looks from the screen down to the mouse and with a shriek seems to realize that the movements Mark is doing with his hand on the mouse is responsible for what is happening on the screen. Although not conscious, Mark is modeling to Elly how to use a computer mouse.

A few days later, video (CV2.7 10:05- 13:00) captured Mark again modeling for Elly how to use the mouse to access and play an online game called *The Great Flood*. Once in the program, he demonstrated and verbally explained to Elly how to click on the corners of the screen to turn the page and click on the arrow to have the animated book read the story out loud. Unfortunately for Mark, after 5 minutes Elly became tired of watching Mark's modeling and the moment he released the mouse she grabbed it and took it upon herself to apply what Mark had been modeling. At this point Mark and Elly struggle over who will control the mouse, illustrating how difficult it can be for a mentor at this age to let one's mentee practice what has been modeled.

Although the majority of modeling recorded on video came from mentors who were older than the study's 5-year-old participants, there were instances where participants acted as mentors and modeled teaching and learning strategies to their peers, older siblings, and parents. For example, three of the Canford's video disks (e.g., CV2.7 0:00-7:00, CV3.2 4:42-23:35, CV3.4 0:00-6:50) captured Chris and Mark playing an online video game at Mark's home. In three of the four disks, Mark is shown introducing Chris to the game and/or modeling how he thinks Chris could/should play the game. In one video (CV2.7 1:05-4:08) Mark models to Chris how to use the space bar, the key with the letter "H" on it, and the arrows on the key pad, in order to move the player on the screen and shoot the enemy. When Mark's turn is over, and he feels he has demonstrated enough of the skills to Chris (and Chris acknowledges he is ready to play), Mark moves the keyboard towards Chris while pointing at the arrow keys and reminding Mark he'll need to use these keys in the game. Chris then begins playing, frantically peppering Mark with questions such as "What is 'H'?", "What does 'H' do"? Mark tries to answer Chris' questions quickly while reminding Chris to use the skills Mark just modeled.

After a few minutes of playing, Chris gets into a part of the game where Mark hasn't been and they need to combine the knowledge and skills of both to beat the game. At one point they're so busy simultaneously applying, shouting out, and energetically modeling to each other various game playing strategies and skills that they know (e.g., operating the arrow keys, the mouse, the space bar, and the infamous "H" key), that they end up talking simultaneously and intertwining their arms together in an energetic but fruitless effort to help each other win the game.

Later, during a second cycle interview with Mark, the researcher decided to follow up his observations regarding Mark and Chris' modeling and mentoring. The

researcher wanted to know more about Mark's concept of mentoring and modeling new ICT skills to his peers. Thus while Mark was acting as a mentor to the researcher, and showing the researcher how to play a game on hotwheels.com, the researcher initiated the following conversation,

Researcher: Let's say Chris was here right now, how would you teach him to be really good at this ((video game))? What do you need to know?

Mark: Well when friends are over I just show them what to do. It's easier and they watch what my fingers are doing, so that's how I control it. ((looking intently at the computer screen)) Oh! the red ones are the best!

Researcher: Now how do you tell them how to win?

Mark: There are just words and that's how you win.

Researcher: At the end it will say you win?

Mark: No at the end it will say finish line. (C2Q4)

For Mark, modeling not only required spending time demonstrating the required skills, but that a mentor also needed to be familiar with what will likely happened next (in this case the words 'finish line' will appear).

Although the Canfords did mention in their third interview that Mark would likely be the one that would be modeling and mentoring them into the world of very different and fast paced new ICTs of the near future (C3Q7), field notes that the researcher made (FN5 02/14/2008; BN4 10/01/2008CN; CN3 22\_01\_2008) while observing participants play video games at home and daycare, found that three of the participants were already very eager to jump into this ICT mentoring role – especially if mentoring involved modeling to adults how to use these technologies. For instance, during one of the researcher's visits to Nick's home, Nick eagerly demonstrated to the researcher, and

discussed with the researcher, his strategies for matching up cards in his *Freddy the Fish* game. He also took the time to offer the researcher advice for playing the game and trying out some of the demonstrated skills.

The interviews repeatedly revealed the important role that hands-on mentoring and modeling played in teaching participants the skills and knowledge required to use new ICTs. However, it was the video data that demonstrated that this modeling and mentoring occurred in all families, with the vast majority of modeling coming from older mentors more experienced in using new ICTs (parents and older siblings), with the majority of mentors showing participants how to access and use new ICTs, and play computer games. Furthermore, whether it was a third cycle video of Lily receiving help from her mother in turning off and 'lens-capping' a video camera (S3.1 0:30-1:38), or a first cycle video of Liza and Ron explaining and demonstrating to Chris how a JumpStart calendar's columns and rows work to organize and sequence information (BV1.1 9:45-17:05), whenever participants had access to someone who had more skills or knowledge about the new ICT skills, they quickly asked and received from these mentors modeling-based instruction of a highly visual nature.

### ***5.1.2 Principle #2: Child initiated and controlled learning***

The principle with the second largest number of data slices described how 5-year-olds initiated, guided and controlled a large part of the learning (and teaching) process when using, or learning to use, new ICTs. During the interviews, all of the parents indicated that their explorations with new ICTs often were initiated by the participant and usually were motivated by the participant's desire to learn how to use specific new ICT software and hardware, how to play video games, or get information from an Internet capable computer.

This principle was best reflected in a conversation the researcher had with Mark's mother, Sharon, where she explained that Mark's time on the computer was "pretty much Mark driven" (C1Q7). She then gave an example of a learning/teaching situation where Mark's curiosity to know more about a topic guided the direction their Internet explorations took,

Sharon: We were talking about armadillos one night, because we were playing. I would pretend to be an animal and he has to guess what the animal is. He didn't know what it was so he asked to go on the computer.

Mark: And she showed me! (C1Q7)

Several other videos captured interactions between Mark, Alex and Sharon while using the computer, and further illustrate the Canfords' commitment towards letting Mark initiate and 'follow his passion'. For example, in a first cycle video segment (CV1.4 1:36-2:51) we see Mark focusing intently on the computer screen fervently searching for and viewing information on his favourite hockey team's progress. He logs into the NHL.com website without any help, selects which highlights to watch, and chooses to listen to an ongoing play-by-play web cast for his team. Similarly, in a second cycle video (CV2.4 2:33-2:35) Mark and his father are busy making snowflakes to decorate their home and give to Mark's teacher as a Christmas present. They've found a website containing snowflake making instructions and Alex has demonstrated to Mark how to make one. Sharon then encouraged Mark to "scroll up and find a snowflake you want to make" which Mark does. Again Mark is not forced to use the computer, but he is encouraged to make his own choices and follow his own interests.

Except when Chris helps his sister Liza play JumpStart, her favourite online game (e.g., BV2.7 1:34-6:47), the majority of the Bronwells' video captured Chris independently visiting and choosing online games from hyperlinked lists of games from

web pages such as webkinz.com, hotwheels.com, clubpenguin.com, msn.com, pbs.org, and cbc.ca (BV3.2 12:34-15:30). For example, in a third cycle video, Chris is videotaped independently exploring the clubpenguin.com world (BV3.1 0:00-13:00). Over the next 13 minutes Chris is seen independently choosing which options to supply his penguin avatar (i.e., he changes the penguin avatar's clothes, gives the avatar different equipment, and changes the penguin avatar's colour), independently selects and plays four different video games from a list of 20 or more (pizza making, ocean wave surfing, disco dancing and a visual maze-like game), and within each of the games, he independently chooses which hyperlinks to follow and which gear to buy and or use depending in his interests, abilities, and, of course, gaming funds.

Kate explained that although she may have given Chris the basic skills to access, navigate and play one or two websites, like webkinz.com, it was his desire to play these games that motivated them to independently pursue and learn the gaming skills, attitudes, and knowledge required to successfully play the games they played during this study. Kate summarized this child-initiated and child-controlled approach to teaching and learning, when she stated,

I think I started showing them [Chris, Liza and Carmen] one or two kid-based websites, and then they just seem to go so quickly from there...because if you look at all the stuff that they have gone on, like Webkinz, all that, they sort of come to know on their own. I mean I had to sign them up for the thing. I do try and keep an eye on what sites they are on. Most of them they come to learn without my help. (B1Q6)

Lily not only liked to choose the computer games she played, but she also developed a keen interest in learning how to become independent in writing printed text during the study. There were many samples of her hand printed writing and invented

spelling posted on the refrigerator and on display in the Siperco's front room, most of which were independently initiated by Lily. Lily's desire to communicate through written text also transferred to the computer. Grace explained,

She [Lily] asks to write [on the computer] when I come home from work. She asks to write letters and numbers and she knows how to change the fonts and color of the font and the size of font. She plays with that a lot. (S1Q5)

The first video the Siperco's recorded was taken just before Christmas and captured Lily writing a 'Letter to Santa' with her mother. Again this writing session was initiated and motivated by Lily because, in her words, "I want to write a *big* letter to Santa" (SV1.1 5:47-5:55). During the letter writing itself, Grace allowed Lily to dictate much of the content of the letter, especially the list of Christmas presents. Grace only helped Lily when Lily requested assistance, such as when Lily needed help finding the correct letter of the alphabet on the keyboard, when she was tired of typing, and when Lily required help with her letter writing format (e.g., starting the letter with the salutation, 'Dear Santa:'). Lily also controlled when the letter writing session ended, and she selected the online computer game that she and her mother played afterward. Like the majority of the Siperco's video, this video demonstrated how Lily's parents encouraged Lily to initiate and have as much control as possible over selecting which new ICTs she wanted to use, what online content she wanted to engage with (to a degree), and the sequence in which new home-based ICT skills were learned.

Like every participant in this study, Nick also enjoyed playing a variety of age-appropriate video games. Marika pointed out that many games were introduced to Nick by friends, family, or his daycare workers (F1Q7), and that Nick self-selected which games he would buy from the store, borrow from the library, and play at home (FN7 05/03/2008). Marika also noted that at home Nick initiated when these games were

accessed, what games were to be played, and the order in which they were played. In short, she gave Nick a great deal of independence and control over how and what he learned to do on the computer,

Well, basically he [Nick] will be, like, I want to play *Freddy the Fish*, and I'll say okay here you go let me get it [the computer] plugged in. Then we get it plugged in and I say, "Do you know what to do from here"? And he goes, "Yeah". So essentially it's him driving the situation and being in charge and if he isn't clear on something he will just ask me. (F1Q7)

*Freddy the Fish* was an arcade/puzzle/problem-solving video game that Nick frequently self-selected to play during the course of the study. He enjoyed it so much that he had memorized segments of the audio and text (e.g., FV2.1 1:55-2:55). In all the videos of Nick playing *Freddy the Fish*, Marika left Nick to decide where to go in the program and what to do to solve the mystery. Thus the design of the video supported her belief in giving Nick a great deal of control and independence over his learning to use a new ICT. Marika only came to Nick's aid if she noticed the program was not working as expected (e.g., FV2.2 4:30-4:50), if Nick requested her assistance in finding a hidden object (FV2.3 1:30-2:10), or he required her help solving a problem (e.g., FV2.4 2:24-3:10).

Although the majority of the parents' interview data supported child initiated and child control of their learning to use new home-based ICT hardware and software, the interview data also indicated that parents were very involved with the selection and monitoring of the content that the participants were accessing.

For example, when the researcher asked Lily's parents if Lily had physical access to all of their home-based ICTs they said "Yes". However they noted that this

occurred because they had already put in place some strategies for controlling Lily's access to ICT content,

Grace: Yes, she's allowed to use them all [the Siperco's new ICTs].

Mikkel: Yes, because we still have control of the programs or material she is listening to or viewing so -

Grace: Yes, she can't go to one thing that is there.

Researcher: So, it sounds like you give her content that she selects from, like different websites, different channels, programs.

Mikkel: Yah, so like even when we watch TV we are always very VERY careful what kind of programs we are watching (S1Q3).

Furthermore, Grace and Mikkel indicated that Lily had just begun to learn how to load DVDs on her own (they didn't want her watching movies all the time), and could only go to websites that her parents had bookmarked or showed her how to access.

Similarly, when Mark's mother was asked who selected the content of the CD-ROM music and DVDs that Mark listened to and watched, she indicated "I do, but he can choose between the content" (C1Q3). Additionally, while talking about the disadvantages of Mark's growing use of new ICTs, Sharon noted that she could see that her control of Mark's access to questionable content would become more difficult in the near future,

Sharon: We haven't shown him how to navigate the Internet, we take him to a site and that is where he stays. He doesn't know how to find the sites himself, and that is why a lot of the stuff is on CD-ROMs because I know the content, and it's not going to switch, and it's not going to end up on something he is not ready to see.

Researcher: So that is a disadvantage?

Sharon: Right, and as he gets older I am not sure how much control I am going to have. There will be no TV's or computers in the kids' bedrooms. But who knows what he does 8 hours a day at someone else's house or at school or wherever. (C1Q10)

Furthermore, Kate noted that Chris's older siblings were accessing and exposing him to popular videos on YouTube.com (e.g., *Harry Potter Finger Puppets* and *Magical Trevor*). Although she did not think Chris had yet learned how to search YouTube videos by himself, she did note her concern in his accessing 'bad websites',

I mean you can get to bad websites without any intentions, just by clicking something that's on a page, or spelling something wrong. You can end up somewhere you wouldn't necessarily want the kids to be. But I don't really know how you stop that from happening. (B1Q6)

Kate did note, however, that "I like to know what they are doing on the computer, so I check in, but I certainly leave them to look at the computer by themselves". (B1Q2)

An analysis of the Bronwells' video indicated that Kate and Ron did 'check in' on Chris regularly. For example, of the 56 disks submitted, Kate and/or Rob were heard or seen on 26. In many cases, Kate and Ron came over and watched or helped Chris. Other times they just asked "What are you doing?" or "What game are you playing?" There were probably many more instances of Ron and Kate visually 'checking-in' on Chris as footsteps could be heard nearing and entering the room that Chris was in, but you could not see or hear evidence that would confirm Kate or Ron's presence. Furthermore, although it could not be determined whether or not Kate and Ron's visits were a conscious 'checking in' on Chris, or checking that the video was still recording, or just entering their room for other reasons (the computer was in Ron and Kate's

bedroom), the frequency of their observed visits did support Kate's statement that she keeps an eye on the content with which Chris is engaging.

In summary, findings from the video data and researcher's field notes supported the parents' observations that a great deal of their 5-year-old's learning how to use, and using, new ICTs was initiated, sustained and controlled by the participant. However, data also indicated that even though parents encouraged their children to have control over which ICTs they were to learn to use next and when, parents still played a central role in selecting the content from which children were able to choose.

### ***5.1.3 Principle #3: Just-in-time learning and teaching***

Closely related to the principle of student initiated and controlled learning, and the principle of mentoring and modeling, is the two-pronged principle of *just-in-time learning* and *just-in-time teaching*. In this study, just-in-time learning is defined as occurring when something or someone (usually a more knowledgeable and competent someone) presents explicit information, skills, and/or attitudes to a learner at the very moment the learner makes a request, so that once this information, attitudes and/or skills are acquired, the learner can move forward in their own understanding or practice (Ellyard, 1998).

Just-in-time teaching occurs when someone (again, usually a more competent someone or 'teacher') perceives, before the learner does, what skills, attitudes, and/or knowledge the learner will require to move forward in their learning, and that this teacher introduces the required skills, attitudes or knowledge to the learner just before, or just as, they are required by the learner (Novak, Gavrín, Christian & Paterson, 1999). The main difference to these two just-in-time-concepts is that the former is motivated and initiated by the learner wanting to use the ICT, whereas the latter is motivated and

initiated by the 'teacher' who foresees the learner's need for implicit or explicit information or instruction in order to successfully use the new ICT.

However, it is also important to note that both just-in-time learning and just-in-time teaching occurs at the point in time when the learner is most likely to need, understand and use the requested, or soon-to-be-required, ICT information, skill or attitude.

These just-in-time learning and teaching principles occurred time and time again throughout the videos, and were indirectly discussed by parents in the interviews (e.g., C1Q7; F1Q6; C1Q6). A strong example of just-in-time learning and just-in-time teaching occurred in a segment of the Siperco's first cycle video (SV1.6 8:59-9:25). In this video Lily was learning how to use Grace's cell phone to connect to the Siperco's hard-wired home phone. Lily had Grace's cell phone in her hand, was facing Grace, and was sitting on their carpeted front room floor with her legs folded underneath herself. Grace was sitting on their couch holding the land-line phone in her lap. With some prompting from Grace, Lily used the cell phone to correctly enter and dial the land line. The land line in Grace's lap rang. Grace turned on the talk button and said, "Hello"? Lily then looked at the top of the cell phone and asked Grace, "Is this where you speak"? Because it is not clear where Lily is pointing to on the phone, Grace says "Yes", and Lily incorrectly begins to speak into the earpiece of the cell phone. Grace immediately noticed the error and corrected Lily by stating, "No, no you put that end at your ear". Lily followed Grace's instruction and correctly placed the earpiece over her ear and the mouthpiece near her mouth, and began using the cell phone to listen to, and talk with, Grace.

In this example, the just-in-time learning occurred when Lily realized she needed more information to use the phone correctly, and with a hand gesture towards the phone, she asked her mother, "Is this where you speak"? With a quick "Yes" Grace

immediately responded to Lily's need for information and Lily was able to move onto using the ICT with minimal frustration. Characteristic of most just-in-time learning situations involving new ICTs, the learner, Lily, realized that she didn't have the required information (and/or skills and/or attitude) to operate the new ICT, thus she initiated and directed a request to a more competent other, Grace, for the appropriate information, skills, and or attitudes. And Grace immediately and explicitly provided Lily with the required information, just-in-time.

However, Grace quickly noticed that Lily was still using the cell phone incorrectly, and she told Lily to move the top part of the phone, the earpiece, over her ear. Grace's ability to foresee the frustration that would likely follow Lily's incorrect positioning of the cell phone motivated Grace to provide just-in-time teaching which in turn helped Lily make the necessary adjustments and use the new ICT with minimal disappointment.

Of all the participants in this study, Nick spent the highest percentage of observed time working independently on his family's home computer. However this did not mean that the Fletchers' video did not contain examples of just-in-time learning or just-in-time teaching. For example, in the video recordings of Nick playing computer games, Marika could be seen and heard in the background of the camera frame occasionally walking back and forth completing house chores such as washing dishes, cleaning the front room, and making meals. Although she was rarely recorded interrupting Nick as he independently played his computer games (unless it was to eat, go to bed, or move on to another scheduled activity), Nick was well aware that Marika's assistance was close at hand. Thus without taking his eyes off the screen, Nick would either quickly tell Marika how he succeeded in a segment of a video game (e.g., FV1.5 0:00-9:00), or ask her for some just-in-time assistance in solving a software problem (e.g., FV2.2 4:30-5:00) or request just-in-time support in figuring out the location of the

game's next hidden object (e.g., FV2.4 2:10-3:15). In all cases, Marika responded immediately to Nick's requests for help, ensuring that Nick's learning needs were met just-in-time.

However, the video also captured how Marika accomplished some just-in-time teaching with Mark. That is, after she has answered Nick's question, she crouched down beside Nick and watched him use the mouse pad to search for the game's next hidden object (FV2.4 2:10-3:15). Through her observations, Marika noticed that Nick could use some different mouse-pad search strategies that she knew of and which would help him be more successful in finding the game's hidden objects. Consequently, she teaches Nick some new and just-in-time mouse-pad skills by holding his hand, placing his finger on the mouse pad and slowly moving his hand and finger in an up and down, back and forth, wide sweeping-search motion. To Nick's delight, this search strategy eventually uncovers a hidden object, and Nick is seen in subsequent video using the same mouse-pad sweeping-search strategy.

Unlike Nick, who averaged approximately one example of just-in-time learning and one example of just-in-time teaching in each hour of his first and second cycle videos, the Bronwells' video exhibited multiple examples of both types in the average hour (or less). For example, in a 23 minute video (BV1.13 0:00-23:35) of Chris, Liza, and Ron collaboratively playing the online game, *Jumpstart*, there were 26 examples of just-in-time teaching and 12 examples of just-in-time learning. An example of this just-in-time learning and teaching occurred as Liza guided her avatar around the *JumpStart* world searching for a new place to explore. Chris was sitting to her right watching the game on the monitor and talking to her occasionally. Suddenly Chris speaks out,

Chris: OH LIZA! I SAW A PLACE! Go back.

Liza: Okay.

Chris: Go around there (Chris gestures towards and to the right of the monitor).

Liza: Cool. A slide! But I can't get up. How do I get up to the slide"?

Chris: Hoh! That's so cool.

Liza: But I can't get up...(they spend some time looking for a way to the top of the slide)

Chris: Oh, go to Pierre and see if he'll help or has some ideas.

Liza: Pierre is not here.

Chris: Yah he is!

Liza: ((Liza clicks on the 'Pierre' icon and he appears on the monitor and in a surprised tone she says)) Oh! (BV1.13 12:18-14:23)

In this case, Chris sees something newly revealed on the screen and he gives Liza some just-in-time teaching directions to help get her character through the narrow opening. Then Liza announces to Chris her need for just-in-time learning with the question, "How do I get up the slide"? Chris then satisfies Liza's request by giving her some more just-in-time teaching directions, 'go to Pierre' (the game's virtual guide who regularly gives players just-in-time instructions, including game tips and hints), and Pierre gives Liza the information required to access to the slide.

Not all just-in-time teaching and learning was easy to distinguish as separate entities. For example, in a video of Sena and Hope using their home computer (TV4.5 14:37-14:47), Sena has her hand on the mouse and was trying to move the mouse in order to colour-in, and collect, pictures of bathroom objects displayed on the screen. Hope says "Don't forget toothpaste", then points to the screen, then places her hand over top of Sena's. Then silently they move the mouse and the picture of the toothpaste gets coloured. However, at this point it is hard to tell who is initiating and/or doing the

just-in-time teaching (tactilely) or just-in-time learning because it is not obvious which participant is, or which participants are, moving the mouse.

Finally, similar to the *Jumpstart* software avatar, Pierre, who gave Liza and Chris just-in-time auditory and visual instructions and feedback as the game progressed, participants were continually receiving and giving each just-in-time auditory and visual feedback in most of their online gaming experiences. For example, analysis of video found that when working with family or friends, children regularly indicated their disappointment and/or joy both orally and through facial and body gestures (FV2.4 3:10-4:00, SV2.6 15:00-16:25, TV16:40-17:35). Similarly, the computer gave participants information through non-vocalized sounds and sound effects feedback (e.g., car crashing sound indicating you did not succeed at a driving game. CV2.7 5:10-5:20), through pre-recorded or synthesized voice instructions (e.g., online game tells Sena and Hope the direction of an elevator. TV1.3 6:30-7:30), or they heard a significant change in the sound (e.g., Chris knows he has won an arcade game when he hears a loud ascending tone. BV1.10 4:25-4:31).

#### **5.1.4 Principle #4: Observational learning**

The fourth principle was developed from 38 data slices and was very closely associated to the *Mentors and Modeling* teaching/learning principle. Slices for this principle described how the 5-year-old participants learned to use new ICTs by observing a more competent<sup>9</sup> ICT user .

The parents of all five participant's referred to this 'observational' teaching and learning principle a total of 18 times across interviews one, three and four. Sena's father, Kevin, helped describe and define this learning principle when he explained

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<sup>9</sup> A 'more competent' ICT user is defined as anyone that had an ICT skill, attitude, or knowledge that the five-year old did not have but which the five-year old wanted or needed to acquire in order to use (or more effectively use) the desired ICT hardware or software.

Sena's (and, at one time, Hope's) preference for learning how to use new ICTs by observing others,

I think a lot of times it [teaching/learning to use new ICTs] happens with my wife or I, the parent, showing them once, or however many times. A lot of times they're just watching you do it and that's how they're learning. Whether we're consciously showing them how to do it or not. I think most of the times...(2) For example the DVD player, I don't think I ever showed my daughter how to use it. She just saw us using it over and over and figured out how to use it, or how to use the remote control on the television. Again just she saw us doing it over and over and figured out how to do it. (T1Q7)

Chris' mother, Kate, provided a similar descriptive example of this principle stating "I think a lot of how they pick up on these things [using ICTs] is watching people do things that they do in everyday life" (B1Q6). Similarly, Marika reflected on how Nick learned to use the daycare's computer and said "Nick saw them [Nick's friends] doing it, and the more he watches these kids doing it, the more he picks up from them". She added, that at daycare,

They [Nick and his friends] watch one another when they are doing these games, so the amount of time they spend on the computer directly is probably only about 20% and I think that's where a lot of learning goes on. (F1Q7)

Sharon also said that Mark "will just sit and watch, and that is how he seems to learn. Watch it first and then when he gets his comfort zone then he will do it himself". (C1Q10)

Lily's father not only restated this principle but noted that if anyone tried to persuade Lily to use the new ICT before she had spent enough time watching someone more capable using it, then the learning/teaching opportunity would likely be marginalized or lost altogether. He said,

She likes to observe what other children do without necessarily being asked to observe, for she just wants to observe, and then after a while she is going to practice what she saw without being asked. So if you impose on her a way to learn, you have to learn this, and then show her how, most of the time its 'no' (waving hands and shaking his head side to side). (S1Q7)

The interview transcripts also found that two participants were aware that observation played an important role in teaching them (and helping them learn) how to use new ICTs. For example, during a second cycle interview the researcher sat down beside Mark and watched him play a online game on hotwheels.com (ironically the researcher was silent through the early part of this interview and learned a great deal by observing Mark 'play' on the computer). At one point in the game the researcher asked Mark, "Okay so now how do you know what to do here"? Mark responded, "Because I have played this before. I mean I watched someone else play it" (C2Q2). Similarly, when the researcher asked Hope and Sena to explain how they would teach someone who had never seen a computer before how to use a computer, Hope pointed to the visuals on the screen and she explained how she would "show them how to use it" (T2Q6).

Although the 5-year-olds' interview transcripts indicated differing levels of understanding about the roles that observation played in their own learning, the researcher did record one field note while observing Nick that indicated that, like all participants in this study, during the interview Nick "was much more eager to show me how he used the computer (especially the games) than he was in talking about how he used the computer" (FN8 05/03/2008).

Findings generated from the analysis of the video corroborated the findings drawn from the interview transcripts. Indeed every disk that captured social interactions between a 5-year-old participant and their parent(s) and/or sibling(s) and/or friends,

contained many instances of participants learning by observing more competent users as they consciously or unconsciously modeled the necessary steps required to, for example, login to a website, develop a skill required to succeed at a challenge, solve a problem, or create an online character.

A strong example of this principle occurred during the Bronwells' first cycle video (BV1.7 0:00-1:47). In this recording, Chris and Carmen sat side by side discussing how Chris needed to learn to use the family's computer mouse and keyboard to master the timing of a difficult ball-releasing skill in order to 'beat' the current level of an online arcade-style video game. Chris is then recorded intently and silently observing Carmen demonstrate this skill. After 2 minutes of near silence, Carmen successfully demonstrates the skill. Chris immediately asks Carmen if he can try. She nods affirmatively, gives him some verbal advice, then vacates the seat in front of the computer. Chris quickly sits down and begins practicing and using his newly observed gaming strategy.

In a similar fashion, this observational teaching/learning principle was demonstrated in a Takashi fourth cycle video segment (TV4.5 13:35-14:45). In this video Hope is recorded for 13 and one-half minutes playing a new computer-based video game. Sena is located to Hope's right silently watching the screen observing how Hope's manipulation of the mouse and keyboard helps Hope successfully play the video game. When Hope finally says to Sena, "Now I'll show you how to do it", Sena literally pounces on the mouse and replies quickly, "I know what to do it. Ok now I'll do it". Two minutes later Sena has displaced Hope from her spot directly in front of the screen, and Sena is off and playing the game on her own while Hope sits off to the left giving Sena occasional gaming tips.

Although these two aforementioned videos illustrated how participants in this study could sit silently while observing and picking up skills and information from more competent new ICT users (or mentors), more often than not the 5-year-olds' observations were accompanied with intense verbal exchanges and question-answering sessions with their mentors. For example, Chris rarely sat silently at the computer for more than a minute when observing another more competent ICT user (the previous video example with Carmen above being one of the exceptions). Often Chris would pepper these mentors with questions and suggestions while he watched them work on the new ICT. For example, in a third cycle video (BV3.3 10:28-13:25), Chris can be seen up early on a weekend morning in his pyjamas using the family computer to play an online pool game that he just 'bought' from a previous day's 'winnings'. Ron, Chris' father, is also in his pyjamas and enters the room. He stops and watches Chris play the game for 20 seconds. Ron then notes verbally that Chris is 'scratching' (the cue ball misses all the other balls on the pool table) and asks if he could teach Chris the rules of pool and demonstrate how the mouse should be used to direct the cue ball in the right direction with the appropriate force. Chris agrees, and Chris gives Ron control of the mouse and keyboard.

For 3 minutes Ron shows Chris how to play the game and use the mouse to make successful pool shots. During this time, Chris asks his father a wide variety of questions aimed at understanding Ron's 'click and drag' mouse strategies. While this is happening, Chris also talks about how poor he (Chris) is at playing pool at the Sanderson daycare, and even suggests his dad try and hold the mouse button down longer in order to shoot the cue ball with more force. Throughout this three minute segment, Chris demonstrated how language (especially questions) and intent observation were used in tandem, like most participants, to acquire the skills and

strategies demonstrated and explained by his father. Similarly, like Sena, after 3 minutes of intense observation and linguistic exchange of information, Chris asks Ron, “Can I try now”? Ron hands the mouse over and after a few more instructions he leaves Chris alone to play the game on his own.

Observation was a key element in both the teaching and learning approaches that participants and their family and friends employed when mentoring each other in the use of new ICTs. Furthermore, “forcing” some children, like Lily to use or learn to use a new ICT before they had observed long enough, ran the risk of having the child reject using or learning to use the new ICT altogether. Finally, it is important to note that after participants had felt they had observed enough to enable them to overcome the challenge (or make use of the new ICT), they quickly demonstrated the initiative to take control of the new ICT (principle #2) and immediately apply their new skills, strategies, knowledge, and so on.

#### ***5.1.5 Principle #5: Play-based learning and teaching***

Data slices for the play-based teaching and learning principle were largely derived from the analysis of interview transcripts and video recordings, with 73% of the 34 slices stemming from video recordings. In this study, play-based learning was defined as any activity that: (a) a participant chose to do as a source of enjoyment and pleasure and which placed the participant’s mind in a “relaxed receptive frame of mind for learning” (Prensky 2001b, page 117); and (b) assisted the participant in acquiring (or learning) new ICT skills, strategies, information, attitudes, and so on. On the other hand, play-based teaching was defined as instruction that occurred during an activity that a participant chose to do for enjoyment and pleasure, and during which the teacher (or mentor) was able to help the participant acquire and/or use new ICT skills, strategies, information, attitudes, and so on.

During the interviews parents regularly used the word play or playing when speaking of how the participant used, or learned to use, new ICTs. This was particularly evident when parents talked of how their participant learned to play or played computer games. For example, Lily's mother noted that Lily "plays computer games on the CDs" and "she goes online to play Webkinz [and] she plays Barbie.com" (S1Q5). Kate noted that Chris "played games on his father's Blackberry" (S1Q2), and Sena's father, Kevin, noted that unlike Hope, Sena had not yet begun to play Webkinz during play-dates (T4Q2).

Not only did the analysis of the interview transcripts indicate parents regularly described the time participant spent using and/or learning how to use new ICTs as play or playful, but the analysis also indicated that parents felt they afforded participants a great deal of choice in the types and numbers of new ICT games participants could access and play (see principle 2). Furthermore, most of the games that participants choose to play were seen by parents as containing some degree of play-based educational merit.

For example, Marika noted five reasons why she allowed Nick to play CD-ROM games, and why she played these games with Nick. First, Marika found playing computer games with Nick helped Nick and her to bond (F3Q11). Second, she liked how CD-ROMs like *Freddy the Fish* allowed Nick to access symbols and signs and develop literacy in a "playful way" (F3Q11). Third, she felt that playing CD-ROM games helped Nick in "anticipating what will come next and forecasting and memorizing and, like I said, using problem solving strategies" (F1Q10). Fourth, she could "see what kind of skills he [Nick] is learning and moving through the programs" (F1Q10). And fifth, she liked how playing games like *Freddy the Fish* encouraged him to engage in some creative role-play by,

...forc[ing] him to use certain levels of logic and memory and rationalization and also to determine what the goal of a computer game is. For example, and it makes it more palatable rather than saying, “let’s read about military strategy for the civil war”, he is just being put in the same mind set using a neurosynaptic pathway in his brain, and I think creativity is to become a part of that, and I saw that the most when he played his Freddy the Fish program. (F3Q11)

Additionally, Ron noted that Chris and his siblings enjoyed playing games with “highly engaging activities that can help people learn” (B3Q16). Ron also noted that, He [Chris] has gone and played checkers and things like that online. He finds games that aren’t necessarily pure learning reading and writing, but they’re helping with reasoning skills and thinking. That is helpful stuff. Really, it’s the same as if he played on a board except the advantage I guess with the computer is some of those games you can play against the computer, if you don’t have a sibling right there willing to sit down and play with you, or a friend, So there are times when they can have time playing alone, but they still can be interacting. (B3Q11)

However, some parents struggled with the lack of educational merit that some video games exhibited, and which playing certain video games could encourage. For example, Chris’ mother noted “that sometimes it’s just more fun to play games than to look at a book or sit down and practice your letters” (B3Q11). Chris’s father added,

[Chris] can go play just any game for hours on end, and even these Webkinz games, and those sort of things, they don’t seem to have much value in terms of (.) its mostly about making your little thing go around and then playing on the games, and you’re not really learning anything other than keyboard skills. But it’s not getting any literacy. (B3Q11)

Mark's mother, Sharon, reported that she monitored what games and content Mark chose to play on the computer. However, in her third cycle interview Sharon reported that she had become uneasy when Mark went to another child's home for a play-date. During this play-date, Sharon discovered that Mark and his friend had "watched something that was completely inappropriate, and they didn't ask [permission to watch it] beforehand" (C3Q13). Sharon's lack of direct control over the content of the games that Mark played, further highlighted how some parents were sceptical of giving their children unrestricted access to some play-based learning involving new ICTs, especially if this software and hardware provided unrestrictive access to questionable online information and games.

During the interviews participants indicated that the majority of their time using new ICTs (largely computers) involved play. For example when the researcher asked Nick what a computer was for he said "you play on it" (F2Q1). When Sena was asked how a computer game was different than a book she said, "It's like, you can play games with a computer" (T1Q1). When asked, "What Is your favourite thing to do on the computer?", Chris immediately responded, "Play games" (B2Q2). And finally, when I asked Mark, "Do you have any questions you go to the computer for answers?", he answered, "No, I only play computer games" (C1Q7d).

Although the interviews uncovered no additional information from participants regarding the role play had in their learning to use computers, the video slices made it evident that ICT-mediated play largely meant accessing and playing video games, and learning to do this in a risk-free environment and in a relaxed, fun and engaging manner (BV1.11 0:00-23:35, TV1.4 0:00-43:04, SV3.2 0:00-22:18).

It is important to note that during the interviews parents did not once indicate that the time participants spent using or learning to use new ICTs was void of play, or that

the instruction was forced upon the participant, or that the parent felt the learning experience was unpleasant for the participant. However, Sena and Hope noted that there were times when playing on the computer was not fun. This was especially so if the other sibling was playing a game they didn't want to play, or "when we fight sometimes" (T2Q2).

Video slices reflecting the elements of the play-based teaching and learning principle were numerous, involved all participants, and were largely centered around participants playing games on their family's home computer. Video slices illustrating play-based learning and teaching found that participants and their family and/or friends demonstrated most, if not all, of the following three characteristics:

(a) participants chose the video games they played (within parental limits and as

described in principle #2, e.g., BV4.1 1:28-4:00, CV2.2 4:59-5:25, FV2.1 0:40-2:35, SV2.1 0:00-1:00, TV4.2 2:20-7:44);

(b) participants seemed to be in a receptive frame of mind, were motivated to be playing

games on the computer, and their voices, facial gestures and body language seemed to indicate they were experiencing enjoyment and pleasure while using, and/or learning to use, the computer software and hardware (e.g., BV4.8 1:52-2:25, SV2.1 2:30-3:50, CV3.3 20:29-23:27, FV2.6 5:13-6:00, TV1.8 4:18-8:10, TV3.7 12:30-13:15);

(c) the play that participants engaged in helped them acquire (or learn) and practice or

apply the modeled skills, strategies, information, attitudes, and understandings required to successfully use the new ICT (e.g., BV3.3 10:20-18:30, CV3.4 0:00-2:05, TV3.12 5:02-5:52).

Video also captured examples of this play-based principle of learning that did not involve desktop/laptop computers. For example, in a segment of Bronwell's fourth cycle

video (BV4.4 2:43-23:35), Chris was recorded sitting quietly on the edge of his parent's bed checking out the day's hockey scores and playing an arcade style game on his father's Blackberry. Just to the right and out of the viewfinder his father is reading or working (pages can be heard turning in the background). The two verbally exchange gaming tips occasionally, but for the 20 minutes of recording time little is said. Chris looks relaxed, he seems to be enjoying playing the game, and he indicates to his mom that Ron has been teaching Chris the skills how use the Blackberry to find real-time hockey scores.

Sena is also recorded for more than an hour playing a Nintendo DS game console both alone and with her sister (e.g., TV3.4 0:00-18:37, TV4.6 8:40-18:46). On three separate occasions, Hope shows Sena how to operate some of the console buttons by giving Sena the stylus and guiding Sena's hand as it moves the stylus across the touch-screen game. There are many smiles and laughter during these recordings, and judging by the frequency Sena keeps on trying to take the Nintendo DS game away from Hope, Sena is very motivated to play their Nintendo game.

Play-based instruction or teaching was also captured on the video. For example, an early Siperco video (SV1.6 0:00-6:10) captured Grace using a play-based format to teach Lily how to use the video research equipment. Grace learns how to use the equipment by taking video of Lily dancing and singing. Then Grace encourages Lily to play with the video camera itself (e.g., panning, tilting, using the viewfinder, turning it on and off, and using the lens cap) while encouraging Lily to run out from behind the camera and capture images of herself dancing, and poking fun at Mikkel, making faces at the camera, singing, and so on. For the entire video segment, Grace encourages a teaching (and learning) format that focuses on play, laughter and enjoyment, while

Grace gives intermittent camera-operating instructions as Lily requires the information and skills (or just before Lily needs the skills or information).

An analysis of the interview transcripts found that participants were frequently engaged in play-based learning when learning how to use new ICT hardware and software, especially in their pursuit to access and play video games. Analysis of video substantiated these findings while highlighting that much instruction involved play-based instruction and mentoring as well as instruction while playing video games.

#### ***5.1.6 Principle #6: Unstructured spontaneous learning***

The category that acquired the sixth largest number of interview and field note data slices from every family emphasized teaching and learning as being a spontaneous activity that occurs in an unstructured environment. In other words, aside from daily and weekly scheduled activities and events (such as birthday parties, soccer practices, play-dates with friends, attending school, and going to sleep), parents believed that there was not, nor should there be, any planned or scheduled ICT instructional time and, instead, participants should be (and were) encouraged to use and learn to use ICTs in a spontaneous manner.

Nick's mother, Marika, captured the essence of many parents' opinions on this matter when the researcher asked if she scheduled Nick's time using new ICTs:

In all honesty no. They're completely spontaneous. So there's times when we are getting ready for school in the morning and he really wants to play Freddy, so I'll say yes you may play Freddy until you get the conch. But it's never scheduled.

(F1Q3)

Furthermore, Mikkel noted that he and Grace deliberately avoided scheduling Lily's time using new ICTs (and most of her at-home activities) in an effort to reduce Lily's stress,

There is enough structure at school (1) umm (.) to try to get a different type of structure at home, so they are (1). At these ages they are not stressed yet but they will be in the future, for sure, because the school is a structured environment anyway so we try not to have too many rules at home. We have (father gestures to include himself and his wife), we *had* a structure in school, right? (Grace nods her head) Um, when we were young, so it was stressful. (S1Q6)

An analysis of the video could not determine if the participant's decision to access the computer was spontaneous or not, as the video was usually turned on after participants decided to use the new ICT. However, it was evident in the videos of participants using the computer that their access was not scheduled because video coming from each family ranged from the early morning to weekends to evenings, and included shots of participants playing while eating lunch, being called for dinner, and just after changing into their pyjamas.

For example, there is video of Chris and his father in their pyjamas sporting 'bed-head' hair playing video games in Ron and Kate's bedroom in the early morning light (BV3.3 0:00-23:35), and there is video of Chris and Liza sitting in the same room dressed in their school clothes playing games in the same room in the dusky light of late evening (BV4.4 0:00-2:10). Additionally field notes from observing Chris, Mark, and Sena in their daycare (e.g., BN6 14/01/2008 through to BN11 21/01/2008) after school indicated that even when participants attended daycare in regular time slots, and they had access to a computer in their daycare, their choice: (a) if and when to go on the computer; (b) who they chose as a partner to go on the computer (there was only two at a time allowed to go on the computer-a player and a player's helper); (c) how long to stay on the computer; and (d) what games they played, were often decided at the last minute and with no pattern.

Video also captured participants using linked text and graphics to choose the games they played and to construct paths they chose to go through in these games (BV1.10 1:59-3:02, TV1.4 5:30-18:30, CV3.3 20:13-23:35). Although it can be argued that these video games have some type of structure built into their design that eventually limits and structures the online experiences the participants had, video recordings indicated that the online information navigated to and explored (e.g., CV3.3 20:13-23:35, SV1.6 10:17-21:10), and the activities and games played (e.g., FV2.1 9:00-18:00, BV2.6 3:39-6:50), provided participants a great deal of choice over what to do, and when to do it.

Similarly, video often captured parents giving participants opportunities to explore new ICT hardware and software in an unstructured manner and involving activities and modes of expressions chosen by the participant. For example, Lily was recorded learning how to use a video recorder while expressing herself through dance and song (SV1.6 0:00-6:09). Chris and Mark chose and learned how to play several online games together and even though Mark's mother suggested they alternatively take turns, they often took turns using a format that involved simultaneous play and more closely paralleled their interests and abilities rather than strictly adhering to a number of turns or length of time (CV1.6 0:00-6:50, CV2.7 0:00-6:56).

In summary, scheduled times for the delivery of structured instruction was not reported in the interviews, nor was it observed as being part of the participants' learning how to use new ICTs. Although participants did have to learn how to use these new ICTs within the boundaries of preset scheduled events (e.g., school), and there were structures evident in the video games they played, more often than not, instruction occurred as the need arose (see Principle #3) in an unstructured spontaneous manner.

### **5.1.7 Principle #7: Multimodal learning**

This principle was referred to by parents during the interviews and observed in all videos. Central to this principle was that knowledge, skills, strategies, and understandings could be taught, constructed, learned and communicated using a variety of modalities other than just reading or writing print based text.

Both parents and participants referred indirectly to the multimodality of the learning environment associated with home-based new ICTs. For example, during a third cycle interview Marika indicated that she liked the format of video games because “so many kids are very visual and auditory” and because “there are these little diversions that are very movement oriented” (F3Q16). She continued by pointing out her growing awareness of research and theory supporting learning environments that incorporated more visually-oriented modalities for boys (MacDonald, 2005),

Apparently boys’ brains might be a little bit different, and that the corpus callosum, the way information, the way the information goes back and forth, is not the same as women and boys require more movement visually and more stimulation visually and I don’t know if that is the case for Nick because I am only learning about this theory, but there seems to be enough visual stimulation in this [*Freddy the Fish* video game], and as I said dancing and singing in these videos that really enchanted him. One of the things he likes the most about these [video games] is looking for things, like finding and seeking, which is apparently a very important thing in the male brain, supposedly because they were always the hunters developing this ability to seek and visually find things. (F3Q16)

Mark’s father, Alex, noted how he felt the format of information conveyed through new ICTs, like that conveyed on television and Internet newscasts, employed multimodal communication strategies that he found overwhelming. Yet participants like

Mark were learning to engage with such multimodal communication formats and successfully synthesizing information on a regular basis. He stated,

I am of the generation where you watch the news broadcast and you had the anchorman and that is it. Now you turn on MSNBC or CNN and you have the anchor person, you have got information here scrolling on the left side of your screen, you have the bar down below scrolling information, and then you might have an upper corner, a breaking news type of thing. And, for myself, the way that this article was reading and leaning towards was that someone, such as myself, well my brain wasn't wired to absorb all of that information at one time. But kids because they are getting it this young, their brain is potentially wiring itself to be able to absorb all of that information and spit out what they don't need and only be able to focus on what they actually want to hear. (C4Q6)

Other examples of parents' awareness of the multimodal nature of new ICTs was captured in a fourth cycle interview with the Siperocos who noted that Lily found Internet pictures, video and sound so engaging that she was compelled to ask her parents if the images and people she was seeing and hearing were real (S1Q5). Similarly, when Chris' mother, Kate, had finished viewing video of Chris using the computer with his siblings, she was asked to talk about how Chris was becoming literate. Her reply noted the role multiple modalities were playing in Chris' literacy development,

I think it [his literacy development using new ICTs] is opening different, so many more inputs than we did. We tried to read a book or had somebody showing you how to print, and now here you can get things with sound, with color, with pictures, with video, all these hints. Just so much more. So many ways I guess of looking at something or figuring something out then just looking at a piece of paper. (C4Q7)

In all the interviews with participants, the researcher encouraged them to demonstrate to him how they used new ICTs. In all cases, this involved them showing the researcher their favourite games on the computer. During these demonstrations, it quickly became evident how much they relied on multimodal feedback, especially since most could not read dense text. For example, while Sena and Hope showed the researcher how to play Webkinz they indicated to him that even though Sena couldn't read, the video game software helped her by showing them pictures, showing numbers, and that sometimes characters in the game "would sometimes talk" and tell them what to click (T2Q4).

Similarly, Nick demonstrated how he played his favourite game, *Freddy the Fish*. During his session, Nick told the researcher that he liked the game because characters can move, the computer "tells me what to do", and he liked looking for magic flutes. While Nick worked the researcher noted (FN4 02/14/2008) that there was no text to read on the screen, yet arrow icons told Nick which way to move, clicking on characters gave Nick gestured and verbal hints, and visual and aural feedback was given in the form of animation and contextual sounds when Nick clicked on things or "moused-over" things (e.g., when Nick clicked on a sea sponge it made a bubbling water sound as animated bubbles rose up the screen).

Video data slices captured 17 instances of learning and teaching using a multimodal approach. For example, video (CV 0:24-1:25) recorded Mark and his mother, Sharon, playing a *Clifford the Dog* video game. During this video, we see both Sharon and Mark using their sense of touch on the laptop's mouse pad to move the cursor and click and drag objects on the screen to complete a game challenge. They use their voices to communicate to each other when figuring out and sharing strategies for playing the game, they listen to clues from the voices of the characters on the screen

(e.g., Clifford gives a game hint when he says, “if you want to choose the cloud so you can choose a rhyming word for it click on it again.” CV1.2 3:31-3:37), and they observe the screen and listen to the game’s sound feedback to see and hear if their mouse movement and clicks are accurate (CV1.2 0:45-1:05). Unfortunately the laptop screen is not facing the camera lens and we can not tell what role animation, symbols, text, colour, and so on, plays in their gaming experience.

Video of Sena and Hope captured the girls setting up their first Webkinz account (TV1.4 18:20-30:15). Their explorations into this virtual world demonstrated that the Webkinz software also provided very similar multimodal communication and feedback strategies as that offered by the Clifford game played by Mark and Sharon and Chris (and the wide variety of games played by participants in this study, e.g., CV1.6 0:00-6:49, FV1.7 0:00-19:27, TV3.5 3:13-9:30). In this Takashi video, Hope was in control of the mouse and Sena was observing the screen and listening to the software’s aural feedback in the process of learning how Hope used the mouse, the feedback and her prior video gaming experience to interact with the game. As the Takashi girls interacted with and moved through the Webkinz world, the software provided them ample opportunities to use the mouse as a tactile interface to move, click and animate objects on the screen, as well as providing large amounts of aural feedback (such as beeps for clicking on the appropriate spot and recorded English for all key instructions).

However, unlike the Canfords, Sena is recorded using gestured communication (finger pointing) to communicate to Hope where to click next. Also unlike the Canfords, the Takashis’ computer screen can be viewed and displays the Webkinz world’s highly visual communicative format. For example, the game uses animated characters, animated icons, replay-style examples, text-filled pop-up balloons, and fly-out text boxes to demonstrate to the girls what to do and when, and to convey rules and information

about the Webkinz 'virtual world'. Furthermore, almost every Webkinz object displayed on the screen that Hope clicks on produces some type of sound, music, text, animation, spoken instructions, and new images, or combinations thereof (e.g., TV1.4 18:25-20:59). Like the Canfords, the Takashi girls are recorded engaging in a virtual world that employs a wide variety of communication modalities to give participants' feedback and convey information.

Although all of the participants could read some text on the screens of the new ICTs they were using<sup>10</sup>, the video games that participants played successfully and for prolonged periods of time had little text to read. Furthermore, visual redundancies in much of the new ICT software helped participants understand the gist of instructions or feedback required to play and succeed at the game. Games that required extensive reading, and contained no or little inclusion of multimodal communicative redundancy, usually resulted in participants becoming frustrated or bored, and in most cases these children either changed games or quit playing altogether (e.g., TV1.4 20:03-21:15, BV2.5 5:37-11:10).

Finally, because many of the new ICTs that participants chose to use were screen based and provided a great deal of redundancy, much of the mentor's observed instruction incorporated these various modalities. For example, when Ron was teaching Chris how to play virtual pool (BV3.3 10:00-14:25), he used the mouse and the game's aural and visual feedback to figure out how to shoot the ball. He then employed the game's highly visual and aural modalities (as well as the mouse's tactile interface) to illustrate to Chris his explanation of how to shoot the ball.

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<sup>10</sup> My observations of participants' writing posted at home and at daycare, and the participants' ability to read minimal screen-based text, and parent's descriptions of participant's reading and writing abilities, indicated that participants' were all early emergent readers (Clay, 1991).

In summary, parents and participants indicated in their interviews that new ICTs made use of various modalities. Video substantiated these claims and also highlighted how some ICTs used various forms of multimodal communication to communicate information and skills that could not be easily accessed by early emergent readers. Finally, it was found that mentors made use of an ICT's multimodal forms of communication to teach participants how to use the new ICT.

***5.1.8 Principle #8: Help child become independent user***

The data slices representative of this principle reflected the desire by both participants and family members to have the participant be able to operate new ICTs as independently as possible. Interview data slices indicated that parents were aware of how participants were becoming independent users of these new ICTs, and that parents were pleased by and even encouraged by this growing independence. For example, Nick's mother, Marika, was explaining Nick's fast growing computer abilities when she noted,

Well, basically he [Nick] will be like, "I want to play Freddy the Fish", and I'll say, "Okay, here you go, let me get it plugged in". Then we get it plugged in and I say "Do you know what to do from here?" and he goes, "Yeah". So essentially it's him driving the situation and being in charge and if he isn't clear on something he will just ask me. So it is very much what you spoke of earlier. It's only when they are stuck will they ask you, and that's great that's what I want to foster. (F1Q7)

Video supported the findings that parents, siblings, peers, and even the instructional design of software, encouraged the participants' independent use of new ICTs. For instance, the Bronwell video (BV3.3 15:00-15:54) reveals that once Carmen and Rob had helped Chris solve a problem and understand how to use the new ICT (and they had observed Chris successfully and independently using the new ICT), they

then left Chris to continue independently using it. Even if the mentor didn't leave the room, he/she often sat to the side of the participant or quietly did their own activity or observed the participant independently operate the new ICT. Furthermore, video also recorded instances of participants playing video games that were designed to give the participant just-in-time teaching or allowed the participant to request and receive just-in-time learning. For example, when Sena and Hope, and Mark and Sharon, were setting up the participants' Webkinz accounts (CV2.2 9:43-23:35, TV1.6 0:54-6:57), the software offered them, or allowed them to request access to, the directions, tips, skills, strategies, instructions, and so on, required to learn what to do next to navigate through, and play games in, the Webkinz world.

Finally, analysis of the video and discussions with parents found that all participants spent varying amounts of time independently using the new home ICTs, with the boys in this study spending more time independently using new ICTs than the girls. The three boys spent an average of almost 42% of their observed time alone using ICTs, and girls were observed spending time alone for only 13% of the time. Although there were differences between genders in the amount of time they spent alone using and learning to use new ICTs, it is interesting to note that the amount of time these participants were spending alone supported parents' desire to have their children become independent users of new ICTs.

#### ***5.1.9 Principle #9: Discourse group / highly social activity***

This principle developed from data slices derived largely from three main data sources: (a) field notes capturing observations of three participants as they played computer games with their peers at their before and after school daycare; (b) transcripts of parents' answers to questions about the similarities and differences between their and

the participants' pathways to literacy; and (c) an analysis of video of participants working with peers, siblings, and parents.

Data slices in this category described and illustrated the social interactions and behaviours that participants and subjects exhibited while using new ICTs, and how these behaviours helped shape their social identities and behaviours with their peers and their family on both a micro level (e.g., bonding with siblings at home) and a macro level (e.g., affiliating with the generation of 5-year-old peers in general).

Three of the researcher's field notes illustrated this principle, and were written at two different time periods of the study. All three notes related to observations the researcher made of Sena, Mark and Chris as they played on their daycare's computer. On two different occasions, the researcher noted how Mark and Chris played video games together at the daycare with a group of six children ranging from 5 to 6-years-of-age (CN1 07/12/2007, CN4 03/03/2008), and on one occasion the researcher noted how Sena did not play video games with the others, but that she enjoyed observing other children her age play as they suggested and tested new gaming strategies for the *Little Mermaid* video game (TN 4/12/2007).

In all three observations, the researcher was struck with how the participants learned, created, shared, and taught each other gaming language and gaming 'moves' that described what to do, and when, in the two video games they played. For example, while Chris was playing the *Extreme Goofy Skateboarding* video game, Mark and three other same-age children observed Chris' game play. The researcher made this note,

After school Mark and two other grade one boys were standing directly behind Chris (who was sitting down and playing the daycare computer near the kitchen). They urged Chris to "do a flip-o-rama, do a flip-o-rama!" and "skateboard [Goofy] into the loop-de-loop!". I haven't got a clue what a flip-o-rama is - maybe

something to do with flipping your skateboard? - nor do I know what a loop-de-loop is ((I found out later it is a skateboarding loop similar to a loop in a roller coaster)). I am struck how Chris and Mark and the other 5-year-olds are creating their own language when using the daycare computer, and how they create bonds through sharing this language, sharing knowledge of the skateboarding video game, and how they create a group whose membership is based on knowing and sharing this knowledge and language. These six children seem to be eager to be a part of this group and want to play the game everyday. (CN1 07/12/2007)

The researcher observed Sena, Mark and Chris on an almost daily basis at daycare. But because the researcher had no interest in joining them or their peers in regularly playing their video games, he was unable to develop the same common knowledge base, the same group 'affinity', the same experiential social bonds, the same collaborative impetus (to beat the game), and even the same 'language' to describe and discuss their gaming experiences. In short, the researcher did not feel it was his 'place' to join in, and that he was just as much, if not more, an outsider to this tight knit group of 5- and 6-year-old children as the daycare's 7- to 9-year-old children (who themselves regularly played, watched and discussed strategies for beating a *Harry Potter* video game located on a different computer in a different area of the daycare).

Interview data slices also indicated that parents were aware of the participants' growing social circle of friends and how new ICTs played a role in helping define the participant's identity and/or social grouping and some of their behaviours. For example, during a third cycle interview Marika noted how Nick and his generation of friends became comfortable early and quickly with new ICTs, especially when compared to her father's generation. Marika stated,

He ((Nick)) is never going to be scared of it ((a new ICT)). It took a long time for my father to be comfortable with a computer. He refused to use bank machines, and with a child this is the norm. If you're in a household lucky enough to afford these technologies, it's normative. So, again, it's a social acceptance of a particular format and a way of accessing information, and it is part of becoming part of the culture that you're growing up with. So it's not just literacy, it is the whole growing up in a generation and almost this cohort affect of what's going on. And of course there is still class demarcations and there is still variations within it, but you know Nick's generation is very much using computers by the age of three. (F3Q11)

Like Marika, Kevin also noted how Sena and Hope were growing up with a generation of "kids" who "are not afraid of technology at all, in fact they are hungry to receive more information about new technologies" (T3Q8). Similarly Mark's father noted Mark's generation seemed to be more comfortable than his generation with the idea of rapid change. He stated,

We have, our generation, we were hard wired for a good number of years to a certain way, and now technology is changing so fast, now we are having to relearn new things. For Mark, he doesn't know any differently. To him, he just knows things change, okay. He just accepts the change because technology changes that quick. (C3Q11)

Sharon also indicated that as Mark's social circles grew and expanded, she was becoming more worried about the content and behaviours Mark would be exposed to and learn from other children using new ICTs, especially Internet-based new ICTs. This came after Mark had been invited to a friend's place for a play-date and Mark's friend had introduced Mark to some "completely inappropriate content". Sharon noted that

“That was my first experience with it. I don’t have direct control. Those discourse circles are getting bigger and will become more varied” (C3Q13). As this example demonstrates, parents were well aware that new ICTs were playing a role in shaping what participants shared, and in this case, joining social groups whose knowledge and experiences fell outside of the values developed and shared in their family unit’s social sphere.

Parents not only spoke about generational differences in the manners in which they and their children used new ICTs, but they also spoke of differences on a more micro scale. For example, Kevin indicated that there were differences between his own and Sena’s and Hope’s computer software preferences, stating, “I want to play basketball video games and that is all I want to play.” However, Kevin continues, “the games I would want to play are not games that they are interested in...my daughters have watched me play, and about 30 seconds later they are like, ‘Okay, that is boring’ and then walk away” (T4Q5).

Not only were there differences between the types of new ICT software he and Sena used, but Kevin also noted that there were differences in their use of new ICTs in the presence and absence of friends. For example, he noted that when Sena and Hope had no friends over, they both enjoyed working on the computer together (S4Q2). This was corroborated by the video analysis which found Sena spent almost 55% of her observed time using new ICTs with Hope. However, when Sena and/or Hope had friends over for a play-date, Kevin noted that Sena preferred to play with her friends and not use the computer, whereas Hope and her friends not only played together but that they conducted much more of their play together while using the computer and/or Nintendo DS.

Kevin hypothesized that because Sena and her friends could not read or write independently (many of their computer games required reading and writing skills), they chose to play with dolls. And because Hope and her play-date friends could read and write independently, they enjoyed playing games like Webkinz (a web site that required a great deal of reading and writing). In any case, Sena and Hope did play computer games together, and Sena seemed to prefer not to develop her social relationships with same-age peers using new ICTs, whereas Hope did.

Interview data slices from other participants indicated that their own use of new ICTs, and their peer's use of new ICTs, helped them develop affinities with each other and helped shape their social interactions. This was particularly evident in the manner in which participants introduced each other to online games such as hotwheels.com, clubpenguin.com and webkinz.com. For example, during the second cycle of data collection, Chris attended a play-date with a child not part of this study. During the play date, Chris' friend taught Chris how to access and play games on the website hotwheels.com (C2Q13). One week later, video captured Chris on a play-date at Mark's home teaching Mark how to access and play games on the same Hot Wheels website (CV3.2 10:00-17:30).

Similarly, at the start of this study, only one participant, Chris, had access to a Webkinz account. The account was his sister's. However by the third cycle of this study, the word had been spread across the school's network of children and parents, including participants in this study, that engaging age-appropriate games could be accessed for primary-aged children at the Webkinz website. The effect of this networked information was that by the end of the third week's cycle of interviews and video recording, all of the participants were video recorded: (a) setting up a new Webkinz account of their own (CV2.21 9:40-23:35); (b) playing on their own recently purchased

Webkinz account (SV3.6 5:16-12:26); or (c) using a an existing sibling's Webkinz account (BV3.4 4:26-6:24, TV1.4 2 3:00-6:21). Moreover, during interviews, three parents were recorded speaking about the participant playing on a new Webkinz account (F3Q11).

Not only did data indicate that participants were accessing and building up online experiences and knowledge about the Webkinz world, but data also indicated that these experiences and knowledge were being shared within, and had become part of, the social fabric of the participants' three distinct social circles: family, 'online' friends, and 'offline' friends. For example, data found that Mark, Chris and Nick knew that you could socially network with other anonymous Webkinz 'friends' through a 'Webkinz chat', or by sharing Webkinz gifts with these friends (B2Q1, C2Q1, F4Q1). Lily, Mark, and Sena were also video recorded developing shared social knowledge and experiences with family members, as they collaboratively learned and shared gaming information and experiences related to accessing and playing video games in the Webkinz world (SV3.6 9:00-11:30, CV2.2 3:50-6:50, TV4.5 13:00-16:30). Similarly, data indicated that Webkinz had become part of the participants' 'offline' shared social experiences. For example, Lily and Nick told the researcher that that they had fun playing Webkinz with their friends (SN7 01/21/08), Chris knew which of his friends at school played games in the Webkinz world and knew the type and colour of some of their Webkinz pets (B2Q3). Mark told the researcher that he named his Webkinz animal after a special friend (C2Q2).

Although data slices for this principle indicated that participants' knowledge and experiences with new ICTs was shared within and incorporated into some of their various social circles, participants had not yet begun to regularly access or use email or the chat software such as those provided in the Webkinz world. This could have been due to the highly text-based nature of these two communication technologies. However,

data slices did indicate that one of the motivators behind participants engaging with new ICTs, especially online video games, was to not only beat the game, but to be a member of their social group and be able to share experiences, participate in conversations, and develop affinities around shared experiences involving the use of these new ICTs.

Furthermore, this principle indicated a possibility of differences in the way parents and participants perceived new ICTs should be used and the way they were reportedly used. For example, participants were video recorded using the computer to play a large number of video games (e.g., BV1.7 0:00-23:35) whereas parents reported using computers for work, education, and communication (e.g., S1Q9, T1Q9, C1Q9). Moreover, this principle found that participants learned to use, and used, new ICTs in a variety of social circles, in a variety of settings (e.g., family, online friends, offline friends who can read, sports buffs, daycare friends, and so on), and that language was one tool for creating, sharing and identifying with each other's knowledge and shared experiences.

#### ***5.1.10 Principle #10: Seamless and unconscious integration***

The tenth principle was compiled from interview and video recorded data slices, which demonstrated that many of these new ICTs were integrated into the participants' home and daily lives in a very seamless and unconscious manner. Kevin captured the seamlessness of this learning principle as he described how and when Sena and Hope first started showing interest in learning how to use a computer,

I think that with the computers, they were probably 4-years-old when they first started to know about it. And obviously we played DVDs for them, whether it was *Baby Einstein* or whatever, right from day one. So I think they grow up with technology around them their whole lives. I think children now don't quite think of it as technology the same way that you or I don't think of the refrigerator as

technology but yet our grandparents do. Because we've never had a house without a refrigerator, whereas, like, our grandparents probably did. (T1Q6)

Kevin's comments capture the essence of this principle, noting that participants learn to use (and are taught to use) new ICT hardware and software almost in an unconscious manner, in the context of their everyday home life, and right from birth. Learning to use new ICTs is not extraordinary, unique, or something 'special' done outside of the home. Learning how to use a new ICT to find and engage with, for example, entertainment (TV4.6 2:00-3:27) or communicate (SV1.6 6:12-10:00) or find information (CV1.5 0:13-2:50) was viewed as being as natural a part of participant's daily life as using a refrigerator.

In answering a question about the preferred age children should be introduced to and taught new ICTs, Kate expanded upon this principle, noting how a great deal of learning is done seamlessly and naturally through observation. She stated,

They are so surrounded by it [new ICTs] I don't know if it's a real teaching issue. I mean they sit there (2). I used to work a lot from home and I would be doing work and his dad works at home from his computer, so they see people using the computer, they see their older sister. It's not like you are sitting them down and saying this is a computer, this is what it does... its not like sitting there and reading a book, I mean you wouldn't normally sit there and read the newspaper out loud. When I want to read to them I do set the time aside, I point out the words and everything. But I think a lot of how they pick up on these things is watching people do things that they do in everyday life. (C1Q6)

The participant's use of the family cell phone was another example of a seamless and unconscious integration of a new ICT in the participant's life. All participants in this study had used their parent's cell phone, and most knew how to use it independently or

with a little assistance from a parent. For example, during this study, Lily learned how to dial-out on the Siperco's home phone and Grace's cell phone. Furthermore, Marika indicated Nick used her cell phone to call his father and grandparents (F1Q4), Chris knew how to use his parents' cell phone (B1Q3), Sena's father indicated that Sena and Hope saw him and Meri regularly use the cell phone both inside and outside their home (S1Q7), and the researcher observed two participants in this study use cell phones on the school grounds (FN2 18/12/2007; BN8 06/02/2008).

Additionally, video captured Chris using his dad's Blackberry to check on hockey game scores and play games (BV4.4 0:00-23:35), and all of the participants knew how to take pictures with their parents' cell phones (e.g., SN6 14/02/2008). However, none of the parents or siblings ever said they consciously set up times or situations for teaching participants the skills and knowledge required to use a cell phone.

Sharon furthered this idea of ICT instruction being unconsciously and seamlessly imbedded in the participant's day when she talked to the researcher about how Mark learned to use the family's computer keyboard.

The only time we really go on the computer is if he is interested. But I haven't consciously sat him down and showed him the keyboard. Sometimes we help with the row if we look at the first specific letter. But, yeah, it's not conscious.

(C1Q7)

Similarly, the videos the researcher watched contained many instances where the ICT was used (and learned to be used) within real-life home contexts, where the rhythm and flow of meaningful home-based activities concurrently transpired around and alongside the participant using the new ICT. For example, video captured Kevin sharing Valentines Day presents with Sena and Hope while they continue to play a game on Webkinz.com (TV3.2 5:50-6:40). Mark played a video game while dinner was being

made in the background, and up until he was called for dinner (CV3.3 19:00-20:12).

Nick ate lunch while he played on the computer and then played in his pyjamas while his mother could be heard in the background working in the kitchen (FV2.3 0:00-5:00). And Chris sat on his mom and dad's bed and played on his dad's Blackberry while his dad read and did work beside him (BV4.4 0:00-23:35).

In all these cases the video recorded participants using new ICTs in a very natural and comfortable manner as if they had chosen to, for example, draw a picture using pen and paper, or play with blocks or dolls on the front room floor. Life ebbed and flowed around these participants while they used these technologies, and in many cases the technology was part of the time for the family to bond and enjoy each other's company. Furthermore, both the participants and parents did not see the computer as an extraordinary or 'unusual tool' in the home, and the learning and playing that occurred around these new ICTs was as seamlessly and unconsciously integrated into their daily lives as the video that captured Mark and Sharon searching for, and accessing, websites on aardvarks that would help answer some of Mark's questions about this unusual creature (CV1.5 0:40-3:00).

#### ***5.1.11 Principle #11: Comfortable with change***

This principle was largely derived from parents' interview transcripts describing the nature of fast paced change of the new ICTs participants are using, or how participants adapted (and were adapting) to learning technologies and environments that involve fast paced change. For example, Sharon noted that Mark needed to learn to use fast changing ICTs to communicate and learn. She stated,

Every phone is different. Here are like 15,000 different models. And every computer is different. We have a Mac, and at school they don't. It's different, it's

not a Mac. It's (.) everything has a different setup. It's the sheer volume of it.  
(C3Q11)

Sharon later noted that when her husband's Blackberry phone rang she "couldn't figure out how to turn it on to answer it" she thought of handing it over to Mark "because he can resolve it easier than me I think" (C3Q11).

Likewise, Chris' parents noted how Chris will need to deal with changes in something as simple as new ICT input devices (like mice and keyboards) because they believed "over the next 20 years the actual human interface tools are going to change as well" (B3Q15).

Participants did not make any references about change in the interviews. However, an analysis of video recordings found that during the short time span of this study, most of the participants (Nick being the exception) had learned how to use one or two new pieces of ICT software and hardware. For example, it was noted that concurrent to learning the skills required to operate a digital video camera, and cell phone (SV1.6 0:00-10:06), Lily also had learned the new skills of searching the Internet for information (SV1.6 10:16-23:35), using a computer word processor for writing letters (SV1.1 1:03-8:24), and accessing and playing a variety of new games online, such as Webkinz (SV2.1 0:35-4:13).

Similarly, Bronwell video and field notes found that Chris had learned and was comfortable using a variety of mouse and keyboard configurations, such as those found on his parents' PC (BV1.9 15:08-19:25), Mark's Mac (CV3.2 17:12-23:27), Mark's laptop (CV1.6 0:00-0:55), his dad's Blackberry (BV4.10 0:00-4:08), and the daycare's PC (BN7 02/14/2008). Although the differences between computer keyboards (and mice) were not significant, Chris was still able to adapt quickly and with little effort to the configuration differences and successfully play games across hardware setups.

Additionally it was noted that many children were comfortable being regularly introduced to, and finding and playing new video games. For example, Chris was videotaped independently searching for, finding, and playing new video games that interested him (BV4.9 0:45-6:49). In most cases he just dove right in and started playing (BV2.1 2:00-12:10), but in other cases he found them too hard to play and moved on (BV2.5 10:00-10:50). What is important, however, is that like many participants in this study, unless the game was too difficult to play and/or the instructions were too dense to read, children were observed patiently learning to play the game alongside mentors (e.g., FV14:39-18:54, TV2.2 0:00-11:22) and/or through trial and error approaches (e.g., BV2.6 0:00-2:51, SV2.6 7:20-9:30).

Finally, during this study the researcher composed two field notes outlining his observations of the nature of change in video recordings of participants playing online games. For example, after watching video of Chris playing an updated skiing game in Club Penguin, (BV 3.5 0:00 – 0:34) the researcher decided to explore the major changes that had taken place since August 2007 (the researcher's daughter had a Club Penguin account since August 2007). The researcher noted that there was a new gaming area called *The Stage* on the Club Penguin map, there were at least double the number of catalogue items to buy, and three new games had been added (Camp Penguin, Aquagrabber, and Mining for Coins). The researcher noted,

Although the majority of games, the main map, and the rules of the Club Penguin world stayed similar, this virtual world has undergone some significant changes. The ever changing format of the Internet has seemed to change the manner in which children, like Chris, play games, especially when compared to board games that do not change much in format....change is really a new constant for Chris in this online gaming format (BN12 03\_03\_2008).

Similarly after watching video of Sena and Hope play Webkinz (TV4.2 and TV4.5), the researcher decided to login to his daughter's Webkinz account and see if he could detect any changes since August 2007. He wrote,

“The Webkinz main screen had changed again...two games had been redesigned...the games Wheel of Wishes is new, Wacky Zingos Extreme is new, as is Automicoliciousm, and Triple Strike Solitaire...[These changes] highlight that children are subjected to a great deal of change in the physical structure of their Webkinz online gaming experiences, and whether they like it or not, they are likely becoming accustomed to, if not adept in, dealing with such change” (BN12 03\_03\_2008).

Transcripts of parents' interviews indicated that parents were aware that constantly changing new ICT software and hardware would either add challenges and/or new dynamics to participants' ability to learn and acquire literacy. Furthermore, researcher field notes exploring change in participants' online gaming experiences also indicated that participants were familiar with change in using and learning to use new ICTs, especially video games.

#### **5.1.12 Principle #12: Open access**

Data from Table 4 in chapter 4, indicated that parents placed participants' access to new ICTs high on their priority list. Each participant had fairly open access to between seven and 21 new ICTs in their home. Furthermore, all of the parents' interview transcripts indicated that they thought it was important their 5-year-old child had access to as many different types of new ICTs a possible. Chris' mother, Kate, summarized this open access philosophy stating “There is nothing that I would say they [Chris, Elly and Carmen] couldn't touch...They have pretty free access to the stuff” (B1Q3)

Furthermore, both Sharon and Marika indicated that they frequented the public library in an effort to increase their 5-year-old's access to new ICT software and hardware not available in their homes. For example, Sharon stated,

Mark got into the computer when we were living in Minneapolis because the library there had probably 15 [computers] and they all had their CD-ROMs online. So he would learn how to turn on stories and pick icons of whatever story he wanted to listen to, and they had headphones (M1Q9).

Similarly Marika stated,

We are not using websites yet because I don't have the Internet at home. I haven't got that technology or that access. What we do is go to the public library and we try and find the most current DVDs and games that will load onto the laptop (F1Q8).

Video data slices for this teaching and learning category were comprised largely from observations of participants' open access to online games. That is, except for Nick, all participants were either observed independently browsing for, and/or accessing and playing, a wide variety of web-based computer games and websites (e.g., BV 8:22-13:44, CV1.4 1:35-6:31), or they were observed being mentored how to do this on their own (e.g., SV2.1 0:00-3:16, TV 33:30-36:00). Although two parents indicated that they did monitor and control participants' access to online content (B1Q3, C1Q3), and that video demonstrated that parents did monitor participants' online access (e.g., CV2.7 0:00-0:35), video captured parents repeatedly giving participants access to a large set of new ICT software and hardware.

#### ***5.1.13 Principle #13: Fosters critical habits of mind and action***

In this study, critical literacy is defined as the ability to actively reflect upon and question the subjective nature of information and beliefs when making reasoned

judgments and (if necessary) taking appropriate actions. Data slices were allotted to this principle when critical literacy was taught or demonstrated to be acquired, or when it was not taught but opportunities for teaching and learning critical literacy were available.

In explaining how video games can be engaging, fun, and can develop some important new ICT skills like keyboarding, Chris' father noted the importance of designing and exposing participants to computer games that have the potential to develop their critical literacy skills. He stated,

Over time it [video gaming] does kind of dull them [children] to be able to sit down and spend the time. Because not everything can be learned that way, and some things you do actually need to sit down and think, and it takes a lot of concentration to kind of figure out "why this is the way that it is?", you know? ...There is a risk that you're not setting yourself up well by getting accustomed solely to the fun in media as a kid playing video games all the time. (B3Q16)

Similarly several parents indicated that they felt it was their job to help participants engage critically with content accessed through the Internet. For example, Lily's father, Mikkel, indicated that he felt it was largely his and Grace's responsibility to teach Lily critical thinking skills, especially regarding screen-based advertising as seen online or on television.

Am I establishing critical thinking skill for them? Of course I would like to say I am, but consciously, how have I done that? I am not sure especially with advertising and things. You do teach them that they don't necessarily need everything ...[but] I don't know if I have explained to them good and bad advertising and things like that but I would like to think that I have addressed some of the issues already. (S3Q6)

Analysis of video also found that participants were observing a large number of advertisements and consumer 'branding' visuals when searching and playing online games. For example, although not clear, many of the Internet sites that participants visited for information and games contained horizontal advertising banners (e.g., SV1.7 2:07-2:49) vertical advertising banners (TV1.4 5:47-5:57), and consumer brand name logos (e.g., 'SCOOBY-DOO', BV1.12 0:02-0:10).

Finally, there was one field note (CN6 03\_17\_2008) related to a Canford video (CNV3.3 0:00-1:10) that noted that when Mark and Sharon were involuntarily redirected to a list of toys to buy, Sharon did not use this opportunity to teach Mark critical thinking skills. This note also indicated that even with all the advertising that was designed into many visual interfaces of websites (Club Penguin being one of the few that did not have advertising), the video did not capture parents taking time to develop participants' critical thinking skills as defined in this study.

#### ***5.1.14 Principle #14: Portable and distributed***

Data slices representative of the portable and distributed teaching and learning principle reflected how participants were comfortable using (and learning to use) wireless and portable new ICTs in a variety of rooms and social situations around their home. For example, Lily's parents indicated that Lily used their laptop computer upstairs in the bedroom to access the hard wired Internet connection, but when she played games that did not require the Internet she came downstairs and worked in the dining room (S1Q2). Similarly, Mark was video recorded using the family desktop and laptop in a variety of places around the home, including on the floor in the front room (CV1.6 0:00-2:15). Also Chris was accustomed to using their family's portable Sonos remote to control and customize the music played in various rooms around his home (BN1 12/11/2007), he was able to access online games using a variety of Internet-capable

desktop and laptop computers around the home, and he used his father's portable Blackberry to access hockey scores and play games in a variety of places such as his parents' bedroom (BV4.4 0:00-23:35).

Not only did participants use and learn to use fixed and portable new ICTs in a distributed fashion around the house, data slices indicated that similar learning took place outside of the home. For example, Chris and Mark accessed games from the hotwheels.com site from their own homes, from their friends' homes, or at each other's homes when on a play-date. Sena used a portable Nintendo DS game player throughout the home (TV3.4 0:00-18:37). Nick and Mark's parents indicated that the boys had accessed video games and information at the Metro City public library (F1Q3, C1Q3). Chris used Ron's Blackberry to access the Internet and play games on Ron's Blackberry while they traveled in the car (B1Q6). And Sena, Mark and Chris either used or observed others use and learn to use computers at the Sanford daycare (SN5 14/01/2008).

Findings also indicated that mentors also taught participants how to use portable and distributed new ICTs wherever these new ICTs were located. For example, Ron indicated that he and Chris taught each other (and learned from each other) how to use a computer at a local sports store to design a hockey stick for Chris (B4Q4). Marika also noted that she used her laptop to access the Internet and teach Nick how to use the computer and play video games while having coffee at a local coffee shop (F3Q2). Likewise, Sena's father indicated that he would teach, and Sena would learn how to use, portable new ICTs wherever and whenever the need arose. Using a cell phone as an example, Kevin stated,

If I use it [cell phone] at home, that is where they're [Sena and Hope] going to learn how to use it. But that's used on the go. Whether you're at a certain park, or

wherever it happens to be, that's where they're going to learn how to use it.

(T1Q7d)

Finally, it was noted that participants not only: (a) accessed the same software at different places in their home using portable hardware; and/or (b) the same software on different computers in their home; and/or (c) they accessed the same software at other people's homes, but participants also experienced how the software they accessed was distributed across a physical network that could be accessed in a wide variety of places in and outside of the home on a wide variety of new ICTs (largely computers).

#### ***5.1.15 Principle #15: Meaningful and contextual***

The data slices representative of this principle were closely associated with how new ICTs were used in the context of real-world, meaningful activities naturally occurring in the home. That is, the ICT was not used just to enjoy the multimedia attributes of video games, or to learn how to use the ICT's software functions and features (although it could be argued that this learning is still meaningful real-world context), but to use the ICT to solve or serve a naturally occurring need that did not originally involve a new ICT. In short, data slices that fell into this category noted that although mentors taught participants how to use new ICTs and participants learned how to use new ICTs, this teaching and learning was not the focus of the many observed activities and instead usually met other needs of the child (e.g., need to be entertained).

For example, in first cycle video from the SipercoS (SV1.1 0:00-29:35), we view Lily working with her mother writing a letter to Santa. The idea to write a letter to Santa originated from Lily. She was motivated to contact and communicate with Santa and ensure he knew what she wanted for Christmas. The desire to write had purpose for Lily, and it did not involve learning how to use a computer to compose a letter. However, in an effort to meet Lily's real world need, and to do it in the context of the Christmas

season, Grace introduced Lily to new ICT skills and strategies such as opening MS Word, using the keyboard to write, using email to send the letter, and so on.

Another example of this principle is illustrated in the description Chris' father gave of Chris' and his use of design software in a hockey store. During their first visit to the store Chris, Liza and Ron stumbled upon a computer screen in amongst the hockey sticks. They played with the computer, taught each other how to use it, and created a hypothetical hockey stick. The next time they went to the store Chris designed his own hockey stick. He chose the curve style, the shooting style, the stick colour, and he even added his own name (B3Q13). He was motivated by the context of the hockey store and his real-world hockey equipment wants/needs, and he was not solely focused on learning how to use the new ICT stick design software.

Other instances highlighting how the learning and teaching of new ICT skills, knowledge, attitudes, and understandings was motivated by the participants' real world interests and contexts would be: (a) Mark sitting on his mother's lap learning how to use the keyboard to type in a search for information on aardvarks (CV1.5 0:00-5:11); (b) Mark sitting on his father's lap learning how to use an Internet browser's scrolling mechanism to access instructions to make paper snowflakes (CV2.4 0:00-6:15); (c) Lily learning how to access *Google* and click on search buttons when working with Grace to find information about volcanoes (SV10:13-17:45); (d) Lily learning how to use a word processor and browser to write a letter and email it to Santa (SV2.2 13:30-17:31); (e) Lily and Nick learning how to use cell phone buttons to dial and talk to family members (SV1.6 6;16-10:00, F1Q4); and (f) Chris using his father's Blackberry and Mark using his parents' desktop computer to find out hockey scores and video of their local hockey team (BV4.4 0:00-1:01, BV1.4 1:35-3:335).

In summary, data slices for this category described a myriad of instances where the teaching and learning of new ICT skills, information, and attitudes were observed to be largely acquired by participants as an ‘unplanned’ by-product of the more important process of mentors (and participants themselves) seeking to meet the participants’ real-world needs and answer their ‘critical’ questions. Furthermore, this ‘unplanned learning about new ICTs’ was often initiated by the participants in the context of their day-to-day life, and involved them needing to understand more about day-to-day issues and topics that were important to them.

#### ***5.1.16 Principle #16: Kinesthetic and musical learning***

Data slices representative of this principle were drawn exclusively from video and captured participant’s making large active body movements<sup>11</sup> or singing, or both, while using new ICTs, and/or learning to use new ICTs. Many of the video examples are under a minute in duration and involve participants, for example, suddenly dancing, making spontaneous movements, climbing on desks, flailing arms, draping themselves over furniture, and singing to music being played in a video games.

Large active body movements occurred in three different instances. First when participants seemed to be getting bored while observing a sibling or parent use a new ICT (e.g., TV3.4 8:55-18:37, BV1.2 10:55-12:35). Second, when up-tempo music was playing during a game or between game levels (e.g., BV1.2 4:09-4:21, TV1.3 5:55-9:22). And third, when a participant had been sitting still for more than 3 to 5 minutes in an uncomfortable position (e.g., CV1.1 12:55-15:10, SV1.7 5:22-6:38).

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<sup>11</sup> Large active body movements are defined as energetic body movements which require significant torso, arm, and/or leg movement. For example waving one’s hands in the air, dancing in front of the computer, wrestling with a parent, repeatedly moving one’s chair back and forth about a foot, rolling on the floor, and so on, are considered examples of large active body movements. Small or ‘normal’ body movements included body movements such as using a computer mouse, a keyboard, adjusting one’s weight on the chair, tapping fingers, exchanging seats with a sibling, moving to video record some one out of the frame, etc, were not considered large active body movements

Although these large body movements make up a small proportion of the entire video data collected, it is also important to note that the amount of medium body action movement (e.g., shifting one's body weight, rocking back and forth or turning a chair, conducting music with one's hands, looking around at others in the room, leaving the room, shifting seats with another, and so on) made up a much larger portion of the video recorded (BN5 14/01/2008). In the end, the researcher estimates that the amount of video recordings large and medium action body movements that a 5-year-old made while using new ICTs (especially computers) was easily 10 times greater than most adults made when seen working alongside the participant.

The impact music had on participants' large active body movements could be seen in video that captured Sena suddenly begin dancing and shuffling her feet in time to the frantic game music being played in Hope's video game (TV1.3 5:55-9:22). Similarly, Nick is recorded conducting and singing the words of a song being played in the *Freddy the Fish* game he is playing, and Chris and Carmen burst out humming, waving their arms and wiggling in their chairs energetically when their favourite game music is played (BV4.7 5:22-6:08).

## **5.2 Chapter Summary and Chapter 6 Preview**

This chapter has presented the results for research questions number two and three. Findings for question two indicated that participants learned to use new ICTs from four main 'instructors': parents, friends, siblings, and the software itself. Data also indicated variances between the amount of time each participant spent with each of these four instructors, with the average observed time being spread evenly between parents (34%), siblings (33%) and the software itself (30%). Learning from friends only comprised 16% of the time participants were observed learning from others.

Findings for question two also indicated that when learning how to use a new ICT, participants requested assistance from anyone nearby and often drew upon the knowledge and experience of several groups all at once (e.g., parents, siblings, and software). Furthermore, it was observed that participants who had older siblings were more likely to turn to an older sibling than a parent, and the more older siblings a participant had, the less likely they would turn to a parent. It was also observed that only participants with no siblings spent more time using a computer and/or learning how to use a computer with their friends, than participants who had siblings. Finally, teachers had not allowed participants to use the school's computers by the time the study ended on March 18, 2008.

Sixteen categories of teaching and learning principles were identified in answering research question three (see Table 8). The four most frequent categories indicated that: (a) participants learned from mentors who modeled the skills, knowledge and attitudes required to use new ICTs; (b) participants were almost always the ones who initiated and controlled when, how and what was going to be learned about new ICTs; (c) instruction was not planned nor scheduled and most teaching and learning occurred on a just-in-time basis (as the participant required it, or when the mentor thought a skill/knowledge/attitude was required); and (d) participants did a great deal of learning and received a great deal of instruction through screen-based media, thus much instruction and learning were based on children observing.

Chapter 6 interprets the findings from chapters 4 and 5 in the context of the literature review and develops a contextually sensitive critical interpretation of primary children's new and multiple literacies and teaching/learning practices and principles..

## Chapter 6: Discussion

Chapter 4 presented findings that identified and described the participants' home contexts and the groups responsible for teaching the participants to use new home-based ICTs. Chapter 5 presented the types, patterns, and principles of new and multiple literacy learning and teaching meaning-making practices seen naturally occurring within the homes of families whose kindergarten children regularly accessed and used home-based ICTs. This chapter extends these findings through interpretive discussion.

This interpretive discussion is divided into four sections. The first three sections explore the findings in relation to the study's three research questions. The fourth section, titled 'Visualizing Instruction', extends the discussion by presenting several contextually sensitive critical literacy instructional models based on practical pedagogy and aimed at understanding, valuing, and developing primary children's new and multiple literacies. All discussions draw upon research and theory presented in chapter 2 to explain the line of reasoning and provide evidence supporting the interpretations.

### ***6.0 Question #1: What home teaching/learning contexts exist for 5-year-olds learning to use new ICTs?***

According to Selwyn (2003, 2004) children are often presented in educational literature as being frequent and innately adept users of new ICTs (e.g., Prensky, 2001a). Furthermore, with scholarly articles claiming that computers are the "children's machine" (Papert, 1993), that "children are the epicenter of the information revolution" (Katz, 1997, p. 173), and that "children had access and could use information technologies far in advance of teacher's expectations" (Hill, 2004, p. 314), it may come as no surprise that children are also assumed to be naturally adept at using a wide variety of new ICTs in the home context. However, findings in this study indicated otherwise.

For example instead of being naturally adept multitasking users of a wide variety of new ICTs, it was found that children regularly accessed only four of the 14 different types of new ICTs available in their homes. Additionally, because three of these four 'new' ICTs (TV, DVDs, Digital Audio) made use of technologies and engaged children in communication experiences that largely paralleled the analog audio and visual experiences of children over the past 50 years or so, it could be argued that there was only one new ICT (the computer) that offered 5-year-old participants access to new information and communication strategies and practices radically different than those available to their parents when they were children. However, it must be noted that when observed using the computer, the 5-year-old participants did regularly demonstrate comfort and adeptness with the technological hardware and software they accessed.

Contrary to Healy (1999, 2004) who warned that computers compromised a child's mental development, and reduced children's ability to take command of language, sustain engaging thought, and develop the ability to conduct rigorous mental analysis and synthesis, results from this study indicated that parents took an active role ensuring participants did not spend an inordinate amount of time using new ICTs, and that this time was balanced with a variety of other mentally and physically, creative, playful, and engaging learning activities. For example, participants were videotaped accessing new ICTs (including music, DVDs, and television) for an average of 13 hours and 30 minutes per week. This is less than 8% of the total hours in a week, or 16% of children's waking hours, and 25% of the child's waking time out of school. In many cases, it was observed that the time children spent learning to use and using new ICTs was wedged in time slots between mentally and physically engaging activities scheduled by their parents, such as swimming lessons, soccer lessons, hockey practices, music

lessons, daycare events, birthday parties, play dates, chess clubs, weekend trips, visits to the playground, and a myriad of other scheduled and unscheduled activities.

Recent research into children's use of new media in the school and home also indicated that "children are often considered to make more diverse use of information and communication technologies (ICTs) than adults" (Selwyn, 2003, p. 54). At first glance, the findings from this study seem to support this conclusion. That is, video found that children spent almost 80% of their time learning to use and using new ICTs alone or with a friend and/or sibling.

A closer look at this study's findings, however, revealed that parents took a more active role in teaching children how to access all of the new ICTs in the home and in selecting the corpus of hardware and software resources that the participants could access and use. For example, several parents reported that they helped children select CD-ROMs from local libraries, and most parents were responsible for purchasing and downloading the software children were using during the study. Parents were also videotaped helping children bookmark and access online games and websites, and parents self-reported helping participants access online content that was applicable to their child's interests, abilities and maturation levels.

Three parents also indicated in the interviews that they often quietly checked in on the participants while they used the new ICTs, especially when the participants were accessing the Internet. These parents further reported that they did these check-ups to ensure the children were accessing content that was age-appropriate and that the children were not having any difficulties using the hardware or software. In the case where one participant accessed inappropriate content at a friend's house, the parent noted that she became much more engaged with her son's Internet surfing after the event. In short, the finding of this study paralleled that presented by Selwyn (2003) in

which the children's use of new technologies (especially computers) in the home context was actively mediated by their parents and was "integrated in pre-existing family habits, norms and values" (p. 68).

Findings from question one also indicated that the home context differed from the school context when it came to how and when children's time was scheduled for using new ICTs. For example, unlike the time structures many teachers impose upon children in schools (Barr & Dreeben, 2008) (e.g., students must finish a project before a particular day and time, and students must go to the computer lab from 1:00-2:00 pm), parents indicated that they did not formally schedule their children's time for using, or learning to use, new ICTs. This was supported by video data that found children were accessing new ICTs during a wide variety of times throughout the day and week. The unscheduled nature of participants' new ICT time-usage was particularly noticeable as participants played and learned to play their way through levels of a video games over several days and at varying times in the day (in pyjamas in the morning, after school, while eating lunch, and just before being called to bed).

However, it must also be noted that although children's access to home-based new ICTs included fewer time restrictions, access was still organized and scheduled by the activities and social structures of home life. For example, participants stopped accessing and using new ICTs before going to bed, when they joined the family to eat dinner, and when they were to attend scheduled activities and events like a hockey or dance practice.

A review of video focusing on the home context also indicated that participants were comfortable and fairly adept at using wireless new ICTs (e.g., laptops, cell phones, video cameras, Blackberry 'smart phones'). Participants were observed wirelessly accessing information, playing games, and communicating (e.g., with online Webkinz

friends) from anywhere in their home and during a variety of times in the day. All of the participants were videotaped in one room learning to play and/or playing a game at one point in the day, and then videotaped in a different room and at a later time or day playing the same or a different video game.

Aside from ensuring children met their scheduled commitments (e.g., driving to swimming lessons) and ensuring the computer was being used in a safe place (e.g., not using the laptop behind a door), parents seemed to be very comfortable with their children taking advantage of the mobility of these new ICTs. Unlike a teacher asking a class to keep their social studies text in their desk (and only accessing it during social studies period), or having their children follow a predetermined schedule when visiting a school's computer lab to work on stationary desktop computers at preset times, participants in this study were learning to use new portable ICTs to access, communicate and use information any time and in any place in their homes.

Furthermore, as children learned to use their parents' cell phones in places such as the car, at playgrounds and in other locations outside the home, they were also coming to understand that learning and communicating using mobile ICTs enabled them to learn and communicate in a variety of contexts outside the home. Coupled with the reality that participants had not yet been given access to the school's lab-style desktop computers, children were quickly learning that the new ICT tools and their structures of access in the home were much different than the new ICT tools and structures of access in their schools.

In summary, home contexts offered participants access to a rich source of new ICT hardware and software. Furthermore, these children had become accustomed to learning in an environment that offered mobility of ICT resources, fairly open access to information and entertainment, and flexibility and choice in the time and manner in which

new ICTs could be accessed. More importantly, participants were learning that the regular everyday structures and rules that organized their ICT-mediated learning in the context of home were, in many ways, much different than those being developed in schools (Tyack & Tobin, 1994).

### **6.1 Questions #2. Who is teaching 5-year-olds how to use new home-based ICTs?**

The second research question sought to describe who (or what ) was responsible for teaching 5-year-olds to use new home-based ICTs. Findings indicated that participants in this study were learning to use new ICTs from four groups of 'teachers': the participant's parents, friends, siblings, and the software itself.

Similar to findings reported by Plowman et al. (2008) children in this study were being taught to use new ICTs from three main groups of people: parents, siblings and friends. In some cases, children in this study were seen learning how to use a new ICT with input and suggestions coming simultaneously from three different family members. Aside from video that captured Mark struggling to regularly fend off his younger sister from randomly striking the computer keyboard and grabbing the mouse he was using, children in this study sought and received assistance from every available family member and friend regardless of the person's age, gender and level of computer experience.

Although it was not the intent of this study to determine the effectiveness of the instructional approaches of different people interacting with the participant, the fact that participants were eager to interact with, and receive assistance and instruction from, almost everyone and anyone in the room (Mark struggled to share the computer with his 2-year-old sister) suggests that current educational theory supporting the instruction of multi-aged groupings (Hattie, 2002; Mariano & Kirby, 2009; Veenman, 1995) parallels the natural multi-aged instruction and learning occurring in these participants' homes.

Although video indicated that participants turned to, and learned from, anyone that was available in the home, data also indicated there were far more differences between children when it came from whom they sought and received instruction. For example, Lily spent 53% of her time learning to use new ICTs from her parents whereas Chris only spent 11% of his time learning from his parents. Additionally, Lily spent 27% of her time learning from friends whereas Sena only spent 5% of her time learning from friends. In some cases such differences could be explained by family composition (e.g., Chris, Sena and Mark had siblings from whom they could learn, whereas Lily and Nick did not), but in other cases some children just had different preferences for the people whom they sought out (or who came when the participant requested). For example, even though Nick and Lily were both only children, Nick chose to work alone twice as often as Lily. Similarly Nick chose to work alone almost nine times more as often as Sena.

The differences in the frequency between whom children turned for support and instruction in using new-home ICTs, parallels literacy and learning research (Heath, 1983; Street, 1995), and literacy and learning theory (e.g., Eisner, 1997; Greene, 1997; Harste, 2003; New London Group, 1996), which proposes that children develop in their home, and bring to school, very different and multiple literacies and approaches to learning. For example, Nick was videotaped working alone for long periods of time on his mother's laptop and exhibiting behaviour indicative of a high level of engagement (e.g., staring at the screen intently, laughing, singing, and talking back to characters on the screen), whereas the majority of video of Chris found him continually socializing and collaborating with others when using new home-based new ICTs. These and other observed differences between participants' learning and literacy acquisition parallel arguments by New Literacy Theorists (Leland & Harste, 1994; New London Group,

1996), who suggest that instruction and learning activities should be designed so that children are encouraged to not only make meaning and communicate using strategies they bring to school and/or which they excel using, but to also be offered the chance to learn from each other while using as wide a variety of meaning making and communication skills and strategies as possible (Eisner, 1997).

One finding unique to this study was that participants who had siblings were also found to more frequently ask for assistance from, and be video recorded learning from, a sibling than a parent. The reasons for participants' preference to work with siblings over parents may have simply been because parents were too busy doing work or household related chores to stop and teach the participant. On the other hand, participants may have turned to siblings because parents did not share the same interests and/or have the required skills and strategies needed to successfully navigate video game-based content. Additionally, participants may have preferred their sibling's instructional approaches and forms of communications over those of their parent's (recall siblings grew up learning how to make meaning and communicate with participants using similar screen-based new ICTs, whereas parents' grew up using traditional print based ICTs). In any case, the finding that children preferred to turn to siblings over parents when learning to use new ICTs raises questions about adult-centered instruction, while suggesting potential in developing instruction involving older siblings.

One of the most intriguing findings associated with the question, "who is teaching these 5-year-olds how to use new home-based ICTs?", was that new ICT software itself seemed to be playing a role in helping children learn to how to use new ICTs. For example, it was found in the video (and corroborated by parents' interviews) that children spent 30% of their time working alone on the computer and, to a much lesser

extent, using and learning to use other new ICTs like cell phones. During these video clips, the computer was observed to present skills and strategies to participants automatically at certain points in the game (e.g., Chris and Elly's *JumpStart* video game presented them with audio clips of important clues and information after they completed certain challenges), or when the children demanded the information (e.g., Chris and Elly clicked on their Jumpstart avatar icon to receive additional information and tips that would help them access the next game challenge). Both this computer generated automatic and on-demand 'instruction' consisted largely of musical feed back, printed/spoken instructions and/or information, visual feedback, help menus, and animated help-avatars. Additionally, this feed back helped children to understand concepts and events in the game, or provided children fairly relevant feedback after they had tested and retested game-play hypothesis and guesses.

Although the feedback offered by the computer could not be considered anywhere as 'organic', responsive, relevant, and complex as the social meaning making practices that occurred between participants and their parents, siblings and friends, the extent to which participants were able to independently learn gaming content, skills and strategies, from these new ICTs raises similar questions to those raised by Gee (2003). That is, can new ICTs be designed to emulate human instruction? How does the design of video games promote learning? And what teaching and learning principles are indicative of effective video games? Although it was not the focus of this study to research the interactions between participants and their computer, the question did arise, to what degree can and are computers being designed to emulate the social principles and practices characteristic of effective teaching?

**6.2 Question #3. What learning and/or teaching principles do subjects demonstrate in the interactions between family members, friends and 5-year-old learners as they directly or indirectly teach the 5-year old to use new ICTs in the home setting?**

This study's third question sought to identify and describe the principles of teaching and learning demonstrated when 5-year-olds were being taught, and learning, how to use new ICTs in the home setting. Sixteen teaching and learning principles were identified from the analysis of interviews, field notes, and video recordings. The following discusses these principles in light of the current learning and literacy research and theory, and is divided up in the following four sections: (a) socially mediated learning; (b) multimodal learning; (c) child centred instruction and learning; and (e) comfort with change.

**6.2.1 Social mediation**

One important characteristic of literacy development and learning suggested by three of the 16 teaching and learning principles presented in this study was that a great deal of teaching and learning occurred through social interactions and the social mediation of multiple understandings and methods for communicating these understandings. Indeed, approximately 70% of the video captured participants using and learning to use new ICTs through social interactions with parents, siblings, friends, and other participants.

Often these social interactions followed a teaching/learning process similar to the mentoring or apprenticeship process proposed by Gee (2009b, p. 44), in which a more capable other (for example a sibling or parent) uses discussions, demonstrations, working through examples, and direct instruction to teach the mentee (in this study, the

participant) the required or requested skills, strategies, information and understandings. Moreover, video revealed participants engaged in reciprocal mentoring similar to that observed by Grossbart et al. (2002) where the mentor and mentee quickly switched back and forth between their roles and collaboratively helped each other use and learn to use a new home-based ICTs. In some video, it was very difficult to tell who the mentors and mentees were during periods of fast paced reciprocal mentoring.

The type of socially mediated modeling that occurred between participant and their family and friends also paralleled learning theory proposed by Vygotsky (1978). That is, in the majority of cases a “more knowledgeable other” assisted the learner to acquire new information skills and strategies required to use the new ICT (or a new aspect of the ICT), and that this was effectively accomplished within the mentee’s Zone of Proximal Development (ZPD). A good example here would be how video captured Grace acting as a mentor when teaching Lily how to use a cell phone to call some friends. Lily already knew how to use buttons on her own toys and parents’ computer, however her ZPD included not knowing how to numerically enter a sequence of numbers on a cell phone’s number pad when contacting a friend. Grace explained and modeled the steps for typing-in a friend’s phone number, and then encouraged Lily to practice these skills. Once Grace noted that Lily had mastered this skill (a skill that could be said to now reside within Lily’s Zone of Independent Development), Grace then encouraged Lily to use the cell phone to independently type-in her friend’s phone number and place the call.

Furthermore, the mentoring that was observed occurring between participants and their family and friends (and vice versa) emphasized how skills were acquired in a similar fashion as that proposed by Situated Learning theorists, Lave and Wenger (1991), who argued that mentoring was a social process that accentuated the “historical production, transformation and change of persons” (p. 51). Thus in Lily’s case, not only did she learn

the steps for making a cell phone call, but the ensuing congratulations and laughter coming from her parents helped reinforce the importance that they (their family, and their culture and society) placed on knowing how to successfully operate a cell phone.

Similarly, Lily's newly-learned ICT-based knowledge, experience, and skills could be seen as transforming Lily herself in that she: (a) began to build an understanding of how new portable ICTs could keep her networked with family and friends; (b) developed the skills necessary to virtually network with other cell phone users and 'Discourse groups' (Gee, 1999) located next door, across the street and around the globe (e.g., talk with grandparents in Romania); and (c) was unconsciously receiving, from her parents, access to the tools, knowledge, skills, and communication power structures privileged to affluent Western Canadian society discourse groups (Gee, 2008b; Street, 1993).

It was also found that the social interactions and mentoring that occurred between participants and their family and friends involved a great deal of just-in-time learning and teaching. This type of learning and teaching involved the mentor giving the participant the skills, knowledge and understandings immediately after the participant demanded it, or just before the participant required it (as deemed by the mentor). In most cases this just-in-time learning and teaching were geared towards minimizing the participants' frustration. Furthermore, much of this just-in-time teaching and learning occurred within the child's ZPD, built upon knowledge, skills and information previously acquired by the participant, and paralleled findings reported by Gee (2003).

Other than the few instances when a participant's 'more capable' sibling wanted to hold back information and instruction in an effort to frustrate the participant (and hopefully take away control of the computer from the participant), participants rarely had to wait more than a few seconds to receive feedback from a more capable other when using or learning to use new ICTs. Combined with the auditory and visual feedback

continually coming from many of the screen-based ICTs, participants seemed to be receiving a steady stream of information and instruction related to their efforts, goals and questions.

The highly social nature of the subjects' ICT-based instruction and learning contradicts arguments which propose that too much time spent using new ICTs may indeed result in introverted and isolated learners (e.g., Kupfer, 1995; Stoeltje, 1996). Moreover, just the opposite was observed with this study's participants. Most enjoyed and preferred to spend time together with friends, siblings, and parents, developing and sharing common experiences, knowledge and skills. Additionally, the highly social nature of instruction and learning that occurred between participants and their family and friends supports sociocultural theory that proposed learning and literacy development to be a socially mediated process inextricably linked to the physical and cultural context in which it occurs, shaped by the forms of mediating tools available, and which informs the individual of the group's cultural experiences and aspirations (Cole & Wersch, 1996).

Additionally, two participants were video recorded sharing video gaming skills and knowledge while visiting each others' homes and playing together at their daycare. Not only does this highlight the social nature of their learning, but it also highlights how skills, knowledge and understandings learned in one community of participants may be shared (both consciously and unconsciously) across additional and multiple communities through social interactions. In short, the majority of video indicated that participants in this study engaged in ICT-mediated learning alongside others, and this was accomplished both within individual communities of practice and across multiple communities of practice across social environments.

Even though findings from this study appear to support instruction and curriculum centred around socially mediated mentoring and interactions, it must also be noted that 30% of the video captured children working alone when using and learning to use new ICTs. Although it was difficult to determine from the video just how much of this time alone was spent learning to use new ICTs and how much time was spent using and practicing existing new ICT skills and strategies, video did capture evidence of participants learning to use new ICTs using an explorative trial and error approach. A good example here would be how Chris spent a good half an hour by himself clicking on, and clicking and dragging over, objects in a game in Club Penguin in an effort to uncover clues to a skill or strategy needed to make it to the next level. This trial and error approach was similar to learning strategies exhibited both by individuals and groups of children participating in the 'hole in the wall' research conducted by Dangwal and Kapur (2009); Mitra (2003); Mitra and Rana (1999; 2001); and Mitra, Dangwal and Thadani (2008).

Finally, it was found that participants received just-in-time information and feedback from the new ICTs themselves. Although this feedback was nowhere near as complex as the information and social interactions observed occurring between participants and their mentors, it could be said that this feedback did parallel (albeit rather crudely) some aspects of human social interactions and modeling proposed to be important in effective instruction and learning (Gee, 2009b, p. 44). For example, Sena and her sister Hope were videotaped listening to software-generated instructions and observing animations as they learned how to access and play the video game, *Dragontales* (TV1.1 V3:01-5:35).

### ***6.2.2 Multimodal learning***

Throughout the study, all of the participants were observed learning to use and using new ICTs (and were observed being taught to use new ICTs) through multiple

modalities. Whether it was participants observing their parents demonstrate how to access and play *YouTube* videos on volcanic eruptions, participants reading small amounts of texts to know when to start a pinball video game, participants listening to auditory clues to know how they were progressing in the game, participants singing and dancing to music that was playing in a video game, or helping a sister learn how to use a mouse by guiding her hand movement, participants' learning occurred through multiple modalities. This finding parallels the multimodal research presented in chapter 2 which indicated that children communicate using as many modes as made available by the community, the context, and those which children feel comfortable using (Jewitt, 2006).

Findings from this study also corroborated multimodal research exploring young children's in and out of school and non-ICT mediated modes of communication. In both sets of studies, participants were observed making meaning and communicating using a wide number of modes including, image, gesture, gaze, body posture, sound, writing, drawing, music, and speech. Similarly, findings from this study substantiated research by Pahl (1999) who found that children, especially boys, seemed to be more motivated and engaged when learning encouraged them to communicate and make meaning using multiple modes. In this study, video frequently captured children's eyes 'glued to the computer screen' as they observed more capable others teach them how to do something. Video also captured children in intense, but less frequent, social learning interactions with a mentor that employed communication and meaning making that combined visual and discourse modes. These findings corroborated findings by Flewitt (2006, p. 46), who also found that children were learning to use new ICTs largely through the mode of observation.

Furthermore, this study not only revealed that participants learned their ICT skills, knowledge, and understandings largely through the mode of observation, but that mentors

also helped participants unconsciously grasp the concept that patterns of home behaviours, structures, routines, activities and interpersonal relationships (recall participants did not use screen-based ICTs at school) were likely to be different than those in daycare, school and other communities. This parallels findings by Jewitt (2008) and Flewitt (2006), and it illustrates Situated Learning theory by Lave and Wenger (1991) and Wenger (1998, 2007) that proposes 'old timers' apprentice 'newcomers' into the community largely through observation and imitation rather than through discourse alone.

Finally, findings from this study parallel research by Flewitt (2006) who found that young children use the full range of material and bodily resources at their disposal to make and communicate meaning. More importantly, this finding challenges the Vygotskian emphasis on learning as being the result of a strong relationship between thought and language, and instead provides ample opportunity for the development of

...grounded arguments for a pluralistic interpretation of the construction and negotiation of meaning. The data presented clear evidence that language is only one tool in a range of human semiosis, and that individuals' choices of semiotic modes are motivated by a complex web of interconnecting personal, institutional and social factors. (Flewitt, p. 46)

### ***6.2.3 Child centred instruction and learning***

One thread woven through the majority of the research reviewed for this study, was that young children's uptake and use of new ICTs incorporated a child centered model. Whether consciously designed as part of the children's learning experiences (e.g., Hill, 2004; Lotherington & Chow, 2006; Merchant, 2009), or a learning model that developed in a more unintentional manner (e.g., Mitra, 2007; Ranker, 2006;), the majority of studies indicated that ICT-mediated instruction and learning was based on a child-

centred model of learning (Moyer, 2001) and which Hill (2004) characterized as “inquiry based, child initiated, engaging, and collaborative” (p. 6).

Findings from this study also noted participant’s interactions were largely based on a child centered model of teaching and learning. Participants were observed: (a) learning according to their interests and developmental capabilities; (b) making their own choices and decisions (within the confines of the available resources); (c) developing the ability to independently and openly access and use new ICTs; (d) obtaining instruction when they needed it; and (e) learning through unstructured play-based activities.

The potential associated with the incorporation of child-centered (often called ‘play-based’) teaching and learning in the classroom is not new to educators (Frank, 1964). Reviews of current play-based research also finds that child-centered learning promotes young children’s ability to problem solve, think critically, form concepts, think and act creatively, succeed in academics (reading, writing and math), and learn holistically (Bodrova & Leong, 2005; Isenberg & Jalongo, 1997; Steglin, 2005). Child-centered and play-based models of instruction and learning are also a central tenet of current early childhood curriculum development (e.g., British Columbia Ministry of Education, 2009; Ontario Ministry of Education, 2010) and feature in the Association for Childhood Education International’s position statements on effective early childhood instruction (Isenberg & Quisenberry, 2002).

Video from this study also revealed that a great deal of the instruction (and learning) that occurred between participants and their family and friends, was initiated by the participant, and demonstrated collaborative teaching/learning interactions that supported situated learning theory proposed by Lave and Wegner (1991). That is, it was through child initiated and child-centered collaborative interactions that mentors helped

the child learn how to legitimize their participatory role in the community (e.g., helping a participant move from just observing what to do with the new ICT to actually being able to use it independently), while concurrently affirming the family's values that children are able to act and make choices independently, and enjoy taking control of their own learning.

It was also noted that the student centered mentoring occurring between mentors and participants involved rapid just-in-time teaching and learning interactions. Mentors regularly gave students immediate feedback when they thought it would be helpful, and when participants requested it. This paralleled findings suggested, but not emphasized, in current research. For example, Hill (2004) and Hyun and Davis (2005) both encouraged students to use new ICTs in child-centred projects, and found that their students engaged in highly animated discussions and student centred multimodal interactions while learning to use, and using, new ICTs.

Gee (2003; 2009) on the other hand, is one researcher who very openly raises the importance of immediate feedback in video gaming design (Gee, 2003, pp. 111-138) and in human learning theory (Gee, 2009a). He argues that effective instruction must incorporate some type of 'on demand' and just-in-time feedback in order to minimize a learner's frustration and maximize their motivation to stay engaged and keep learning. Findings from this study seem to indicate that when it comes to learning to use new ICTs (especially fast paced video games), a great deal is accomplished through immediate feedback and instruction, and pre-emptive instruction (instruction that mentors gave just before the participants required it).

The research reviewed for this study either did not report that children had any choice in the new ICT hardware or software they used, or that children had no choice (remember most studies were done in schools where a computer was usually the only

new ICT available). Participants in this study were reported to have a great deal of choice in the new ICT hardware and software they used (within the limits of that purchased by their parents). However, research did corroborate findings in this study which indicated that children did make unique choices in their Internet searches and navigational paths when using new ICTs (Spink, Danby, Mallan, & Butler, 2010), and that when given control over how an assignment was to be completed using new ICTs, children were creative, employed complex intertextual forms of representation (Hill 2004), and surprised the researcher with new insights into how knowledge is constructed and privileged (Ranker, 2006).

#### ***6.2.4 Comfort with change***

There were four indications that participants in this study demonstrated a growing comfort with change. First, they demonstrated the ability to access and use a wide variety of new ICTs. Second, they learned to access and use multiple versions of some new ICTs (e.g., two children knew how to operate at least three different family phones - mom's cell phone, dad's Palm Pilot, and their portable home phone). And third, they regularly interacted with online software that had updated its information and changed its appearance during the study.

Participants' high comfort level with rapid new ICT software and hardware design changes parallels New Literacies learning theory proposed by the New London Group (1996). In this theory, it is argued that learners must develop the ability to adopt and adapt to a large number of rapidly changing new ICTs that will bring them in contact with, and demand becoming adept in communicating across, multiple language and modes of communication. Although children were not observed communicating across multiple languages when learning to use, and using, new ICTs, all five participants were either bilingual, or spoke English and were attending a French immersion program.

Interestingly, the New London group also argued that new ICTs would enable and help encourage people to be designers and producers (rather than just consumers) of information, modes of communication and meaning making practices, which in turn would create new ICTs, modes of communication and meaning making practices, which would again add to the growing number of new and changing ICTs, and demand users to be even more comfortable with change. However, children in this study were observed to be largely consumers of information. They usually logged on to established websites and accessed existing video games, and aside from Chris and Elly creating their own ice cream cones, children were not observed designing their social futures. One explanation could be that participants were still at the beginning of their acquisition of new ICT skills, knowledge, and understandings and had not yet developed a critical mass of these tools necessary to enable them to participate in a discourse group that was comfortable with designing their own learning, communication and meaning making practices.

### ***6.3 Visualizing Home-based Teaching and Learning***

The following discussion seeks to represent and extend observed teaching and learning practices and principles through the presentation of interpretive graphics and visualizations. The discussion and graphics move from a discussion of current learning models through to a presentation of graphics representing the dynamics of specific teaching and learning behaviours observed in this study and developed from information revealed in field notes and interviews. The chapter ends with the development of several visuals that integrate features of current learning models that emphasize the social nature of the participants' interactions.

#### ***6.3.1 Current models***

Two of the most prominent principles of teaching and learning exhibited in this study were: (a) learning occurred through the social process of mentoring; and (b) that this

process involved a great deal of just-in-time teaching and learning. As was discussed earlier in this chapter, such findings are supported by Vygotskian sociocultural learning theory which views learning as a social process where more knowledgeable others provide mentored instruction to the learner within the learner's Zone of Proximal Development.

As discussed in chapter 2, Chapman et al.'s (2000) *Support to Independence* model represents the social aspect of Vygotskian learning theory as an outward movement from the child's actual development (which the researcher terms the child's 'independent zone') into their ZPD (which Chapman et al. terms the child's 'learning zone'). The strength of the Chapman et al. model is that it makes a clear distinction between the knowledge, skills and attitudes the child already has learned/developed in the independent zone, and those still to be learned/developed in the learning zone (or ZPD). Furthermore, Chapman emphasizes that through the process of mentorship, the child is taught and learns the knowledge, skills, and attitudes required to expand the independent zone into the learning zone.

Similar to Chapman, the majority of learning observed in this study characterized the process of learning to be an 'outward' movement, moving from what was known or mastered by the learner, towards learning and mastering what is unknown or not yet mastered by the learner. Figure 10 is the researcher's adaptation of Chapman's original model with the addition of black arrows emphasizing the outward movement of a child's learning and development.

Note that these learning arrows give the viewer the sense that learning is the process of 'pushing' and 'pulling' the dotted boundary of the learner's independent zone outward into his/her learning zone. That is, as the learner acquires more knowledge, skills and attitudes from the learning zone (and makes deeper connections, associations across

and between existing and newly acquired knowledge, skills and attitudes), the dotted boundary of the child's independent zone is moved outward into their learning zone.

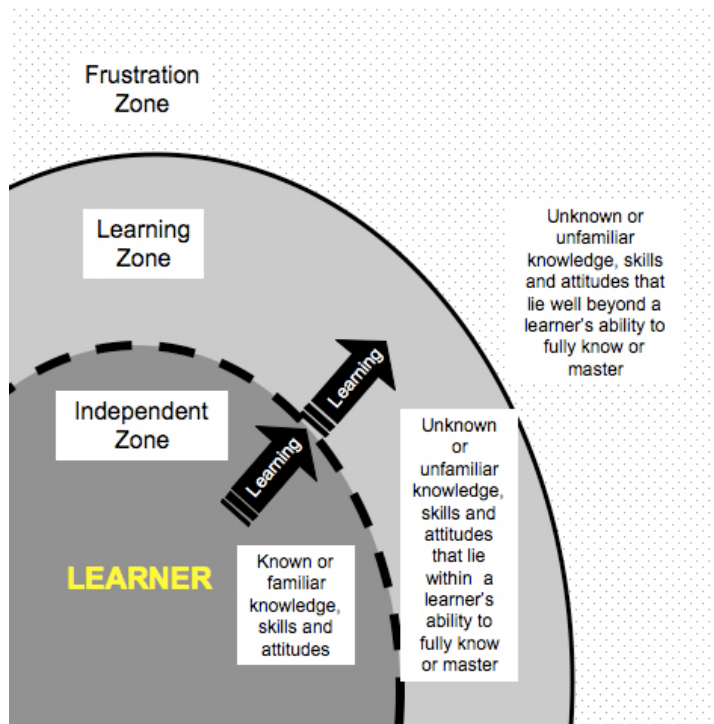


Figure 10. Learning as an outward movement and acquisition of unknown or unfamiliar knowledge skills and understandings that lie within a learner's ability to fully know or master.

The black and white dotted lines in Figure 11 more clearly illustrate how learning can be represented as the movement of the independent zone outward into the learning zone (the striped area being the newly learned skills, strategies or attitudes). Additionally, as the learner makes connections and associations across and between established and new knowledge, skills and attitudes (and as the learner physically matures, and their mentors enable them to access and use different physiological and psychological tools), and the learner's learning zone expands into their frustration zone (represented by black and white horizontal lines in Figure 11). The strength of Chapman's model is that it

demonstrates how learning can be illustrated as a socially mediated process largely responsible for increasing a learner's skills, knowledge, strategies, and attitudes.

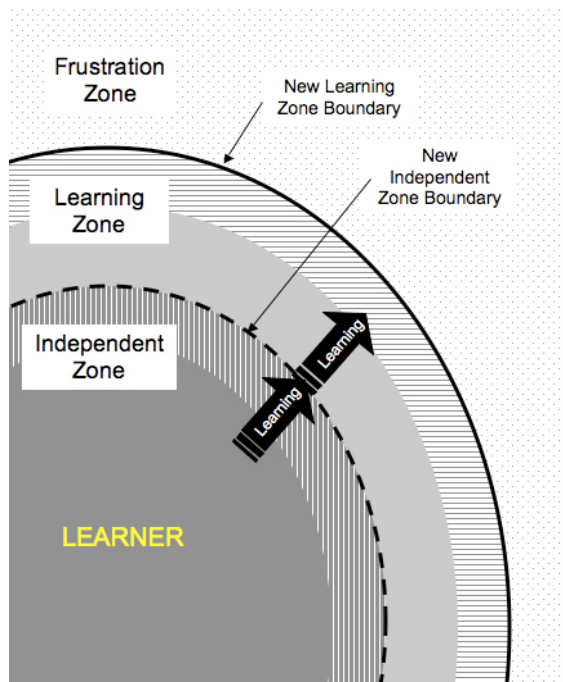


Figure 11. Learning as the outward movement of independent and learning zones.

Along with Chapman's socially mediated model of learning, this study also acknowledges learning theory that conceptualizes learning as a 'flow' or 'continuity of experience'. The continual pushing and/or pulling of the learner's independent zone into their learning zone in Chapman's model is representative of this 'continuity of experience'. Such ongoing process oriented learning can be visually represented in the form of an arrow similar to those presented in Kolb's (1984) four-stage experiential learning model and Exeter's (2001) five-stage experiential model (See Figure 2 chapter 2). Arrows in both models represent the learner's cyclic forward movement through four learning stages (concrete experience, reflection, and abstract conceptualization). Exeter adds a fifth arrow

to visually suggest learning to be a forward and upward spiralling 'growth' of a learner's body of knowledge, experiences and skills. In both models arrows are used to visualize learning as a life-long continuous process of growth, change, and the cyclic expanding of one's width and breadth of knowledge, skills and attitudes.

However, aside from the use of arrows to physically represent learning as a flow of movement, change and growth, this researcher believes that the overall structure of Kolb's and Exeter's models do not provide an adequate visual representation of the dynamic and complex social teaching and learning practices and principles exhibited between this study's participants and their family and friends. For example, the cycle does not represent learning in which participants seemed to skip re-experiencing their original concrete experience as they repeatedly and rapidly applied a wide variety of preconceived solutions to a video game challenge. Moreover, the cycle does not adequately represent the complex dynamics observed occurring in the highly social process of reciprocal mentoring (where participants quickly interchanged between roles of mentor and mentee).

Although the Chapman, and Kolb/Exeter models each have elements that represent and speak to the social aspects of learning, neither present graphics that adequately represent the types of social interactions characteristic of the majority of teaching and learning observed in this study. The following section combines visual elements from both models in an effort to provide new representations characteristic of the majority of teaching and learning observed in this study.

### ***6.3.2 Visualizing the principles of teaching and learning***

As reported in the chapter 4 findings, approximately 70% of the time participants spent using and learning to use new ICTs was in a social setting. In chapter 5, it was reported that participants acquired a great deal of ICT-based knowledge and skills through a process of mentoring and modeling. The following discussion seeks to present a series

of visuals representative of the different types of social teaching and learning practices and principles observed, described and discussed in this study.

Figure 12 visually represents the 'basic' teaching and learning practices occurring in a mentoring session between a participant and a mentor (a more knowledgeable and/or capable family member or friend). In this illustration the participant's *learning* is represented by a black arrow. The trajectory of the participant's learning would have continued on a fairly straight path if it had not been intersected and bent or 'lifted' upwards in mid section by a rising white arrow. The white arrow represents *instruction* (or teaching) consciously or unconsciously provided by the mentor. The upward bend in the black arrow represents learning resulting from the mentor's instruction and which results in the participant acquiring and/or developing new knowledge, skills, and attitudes.

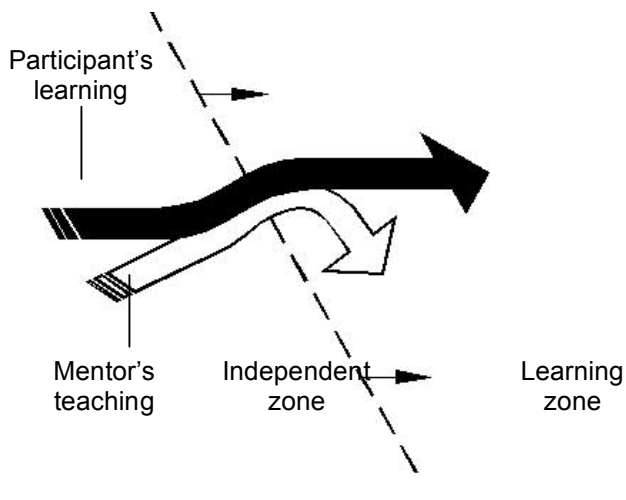


Figure 12. Basic mentoring.

Such 'basic' mentoring occurred repeatedly in the video where mentors used modeling, demonstration, worked examples, and overt instruction to either teach the required information/skills/attitudes to the participant and/or teach participants how to teach themselves how to acquire such information/skills/attitudes (Gee, 2009b, p. 44).

Whether this acquisition was initiated and 'pushed' by the learner (as was the situation in just-in-time learning) or initiated and 'pulled' by the mentor (the case in just-in-time teaching), the result was a growth in the participant's knowledge, skills and attitudes (the rising arrow) and the outward movement of their independent zone into the learning zone.

Additionally, the 'tails' of both the learner's and mentor's arrows have been drawn in Figure 12 as originating within the learner's independent zone in an effort to acknowledge how mentors were aware of and often accessed both the participants' and their own existing background knowledge, skills and attitudes when mentoring. However, it must also be noted that although the mentor accounted for and built upon the participant's background knowledge, experience and attitudes, the majority of the mentor's instruction was constructed from their own background competencies in the knowledge, experience and attitudes being taught.

The type of teaching and learning that occurred between subjects was much more complex than just the mentor giving the participant one quick just-in-time teaching session and then moving out of the learning/teaching picture altogether. For example, video caught Sena's older sister, Hope (the mentor), taking a very long time to demonstrate to Sena (the learner) a variety of new computer mouse movements and clicking skills that would help Sena succeed at playing a Webkinz game. This prolonged mentoring session and large increase in Sena's understanding of how a mouse works can be represented as a black learning arrow that rises steeply and much higher than in the quick mentoring session illustrated in Figure 12. Additionally, Hope's instruction can be represented as a white arrow that is responsible for supporting and pushing/pulling Sena's learning up this steep long 'learning curve' (see Figure 13).

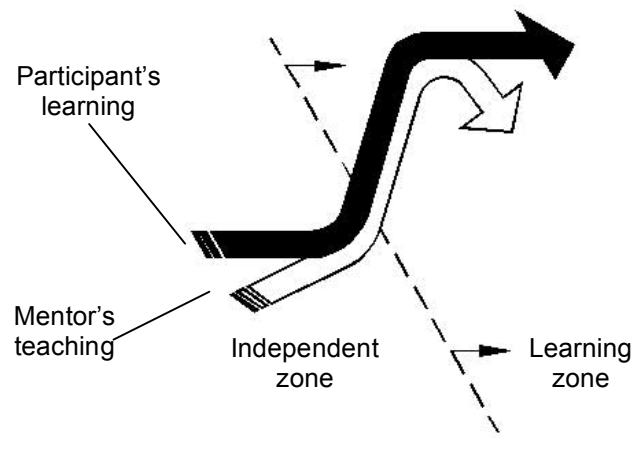


Figure 13. Prolonged mentoring session.

After this prolonged mentoring session, Hope and Sena demonstrated another complex mentoring dynamic as they passed the mouse back and forth and Hope reviewed, tweaked, and demonstrated additional mousing skills to Sena. Throughout this segment of their video, Hope maintained the status as mentor and Sena remained the learner. This style of sequentially ‘chained’ mentoring is illustrated in Figure 14.

Often sequentially chained mentoring was observed to occur alongside one or two other types of mentoring. The researcher termed this ‘tag team’ or simultaneous mentoring. For example, the Bronwell family members were videotaped using a ‘tag team’ mentoring approach when they took turns individually teaching Chris how to complete a calendar in his sister’s *Jumpstart* video game. One person would show Chris one skill or strategy for filling in the calendar and another would follow-up with their own ‘tweaks’ and additional or new skills and strategies for completing the calendar. Similarly, mentors would often work together, or simultaneously teach, when helping Chris master a new skill (often two people would be speaking at the same time or one family member would be talking while the other demonstrated the mousing skills).

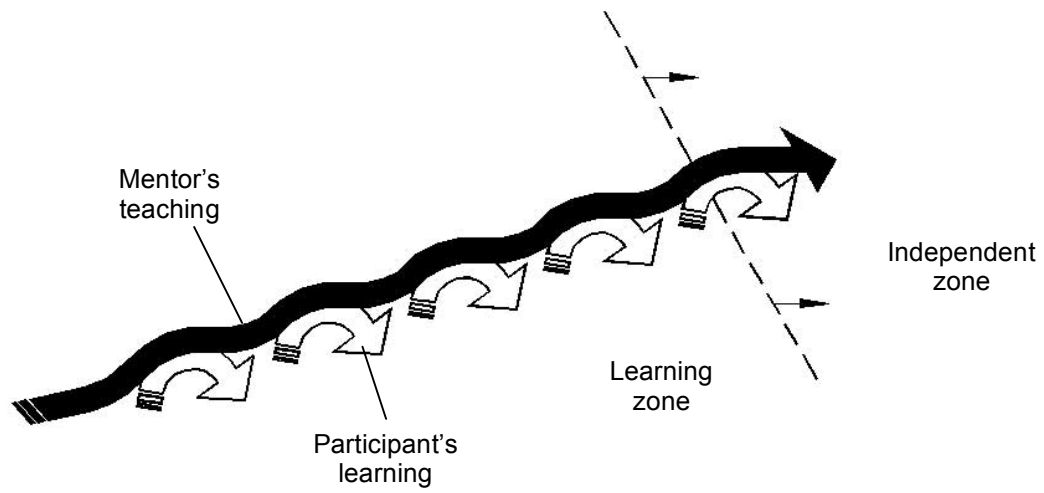


Figure 14. Sequentially chained mentoring.

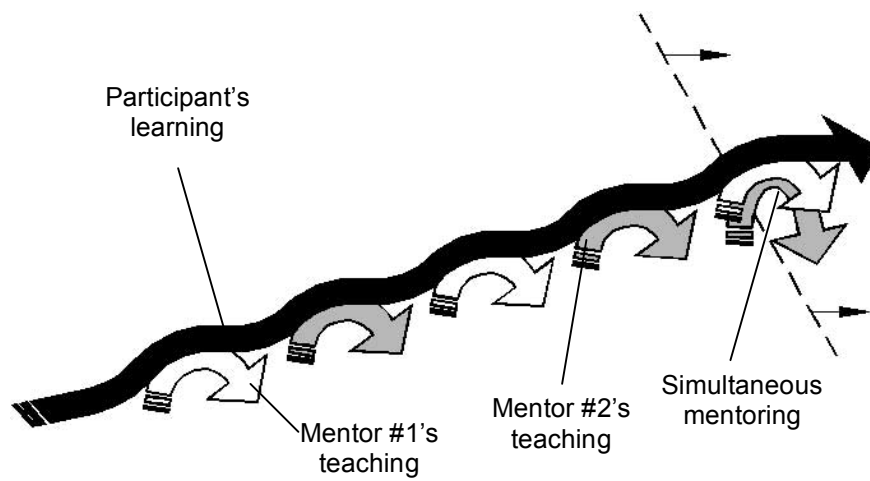


Figure 15. Tag-team and simultaneous mentoring.

The first four alternating white and grey arrows in Figure 15 illustrate the ‘tag-team’ mentoring that Chris often experienced. Additionally, the final upward bend in Chris’s black learning arrow illustrates how two family members simultaneously taught Chris a new skill, knowledge, or understanding (represented by overlapping grey and white arrows).

Mentoring between subjects was also observed to be reciprocal in a similar fashion as that observed occurring between children and parents (Grossbart et al., 2002). That is, subjects in this study sometimes flipped between their roles as mentor and ‘mentee’ in a collaborative effort to teach and learn from each other. Figure 16 represents this ‘oscillating’ mentorship between a participant and a friend or family member (usually a sibling). Unlike prior illustrations, the color of the arrows for both participant and sibling change as they reciprocally flip back and forth between mentee (black) and mentor (grey).

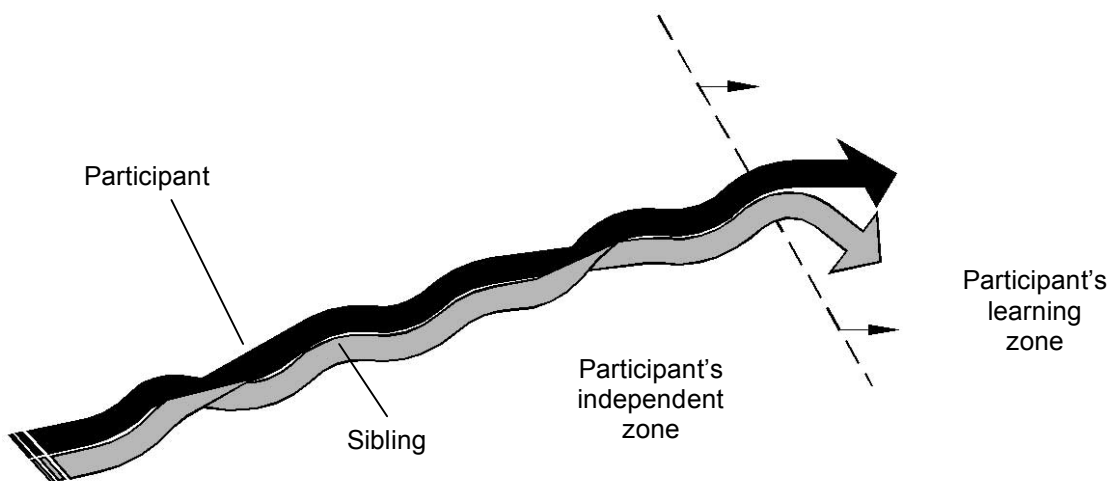


Figure 16. Reciprocal mentoring.

Also note that the participant’s independent and learning zones have been included as a reminder that both of these zones are continually moving outward as the learner/mentee

acquires knowledge, skills and attitudes from their mentor throughout this process of reciprocal mentoring.

The graphics presented to this point have illustrated the variety of ways in which subjects in this study learned and taught each other to use new ICTs. However it was also found that participants spent about one third of their time using and learning to use new ICTs alone. The question that arises then, is can these interpretive graphics be flexible enough to illustrate the learning that occurred between a participant and new ICT they were using and/or learning to use? The data from this study indicate that in some cases it can.

For example, computer video games were observed to give participants a variety of rapid just-in-time multimodal feedback (music, sounds, animations, voiced instructions, pictures, simple words, arrows, and so on). Such feedback helped the participant determine, for example, when a game had started or ended, when a level had been reached, when the participant had made a mistake, what the participant needed to click on, and what they needed to look for or do to make it to the next gaming level. In one instance, video recorded Chris and Elly spending a great deal of time searching their *Jumpstart* video game for clues that would explain what they needed to do next to continue to the next level. After a considerable time, the computer automatically voiced a suggestion that they click on their avatar for assistance in finding out what to do next.

Although this automated voice was likely activated by a predefined time limit that *Jumpstart* video game designers had researched as being the upper limit of the average primary student's patience level when completing this particular game goal, the fact was the computer provided relevant assistance in the form of voiced information that was somewhat similar to the just-in-time teaching family and friends were observed giving to participants. Additionally, it can be argued that it was because the participants' home

computers offered a vast amount of feedback and just-in-time information to the participants in a manner that seemingly began to ‘mimic’ human instruction, that the participants were able to learn as much as they could on their own, and still keep interested and challenged for the long periods they were observed playing video games.

The graphic that most closely parallels the instruction that occurred between participant and computer was that of chained mentoring. That is, video games were observed to regularly (and in some cases, constantly) give participants a chain of rapid observed to regularly give participants feedback and information in the form of text, animations, voiced instruction, visuals, sounds, music, and so on, and this feedback helped the participant acquire the skills needed to play the game and move onto the next challenge. Such a simplistic graphic highlights the limitations of using the current generation of computer as mentor because participants can not: (a) dialogue with the computer in the same complex manner as is exhibited between humans; (b) engage in reciprocal mentoring with the computer; and (c) have the computer emulate the modeling, demonstration, worked examples, and overt instruction reflective of that which occurred between a human mentor and mentee.

Thus far, learning has been represented by an upward bend and a forward movement in a subject’s black learning arrow (and outward growth in the learner’s independent zone). However, it has been theorized that not all learning involves forward and/or upward movement. According to Pateman (2002), some forms of ‘learning’ are accomplished through ‘unlearning’. In this case unlearning is the process of intentionally or unintentionally forgetting and/or rejecting previously learned knowledge, skills and attitudes. Pateman characterized “forgetful unlearning” as largely something done over long periods of time, and it allows the learner to begin learning from a fresh new vantage point. Similarly, Pateman argues that people unlearn when they vehemently revise or

reject (often as a result of critical reflection or life altering situations) knowledge, skills and attitudes that were once held as being correct and/or useful. For example, Carpenter (1997) presented research demonstrating that children can be taught to unlearn incorrect English pronunciation through an auditory process of actively contrasting the student's pronunciation with that of a native English speaker.

Although 5-year-old participants were observed temporarily forgetting their passwords and gaming strategies in this study, they did not exhibit obvious examples of unlearning similar to those theorized by Patemen. However, it would not be difficult to imagine situations where 5-year-olds would need to unlearn some information and skills associated with new ICTs. For example, if a child is presented with an Apple computer after having used a PC for years, the child may need to consciously teach themselves, or obtain assistance from a mentor, in order to help them forget (or unlearn), for example, deeply repetitive finger usage patterns such as login names, passwords, and memorized keyboard 'hotkeys'.

In any case, Figure 17 highlights how these learning and teaching arrows can be used to represent 'unlearning' as a downward and 'backtracking' bend in a learner's learning arrow. The mentor's role in this unlearning process can be illustrated as a white arrow that intersects and helps 'redirect' the learner's arrow down and back. Furthermore, the line between the learner's independent and leaning zone would slow down or stop expanding outward, or possibly even retreat inwards over that which was known.

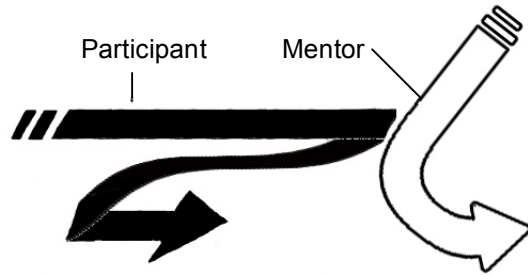


Figure 17. Unlearning.

Aside from when the participant was learning to use a new ICT on their own, video captured participants and mentors engaged in very complex and rapidly developing social interactions involving new ICT instruction and learning that drew upon all of these graphic representations. For example, 20 minutes of video captures Mark and Chris playing video games on the Canfords' computer during which time the boys teach and learn from each other in a reciprocal manner, Mark chain mentors Chris, and Mark's mother mentors both boys on how to access and play age-appropriate games. Additionally there are instances at the start of the game where Mark spends a great deal of time demonstrating to Chris how to play the game, but later on his instructions are much more intermittent, short in duration, and representative of the 'basic' mentoring that occurred throughout all families. Figure 18 is a visual representation of the diverse teaching and learning practices occurring between Mark, Chris and Sharon in just one minute of video (CV2.7 0:00-0:58). Note how this figure uses an 'X' axis of 'time' to capture the frequency and duration of the types of mentoring and social interactions.

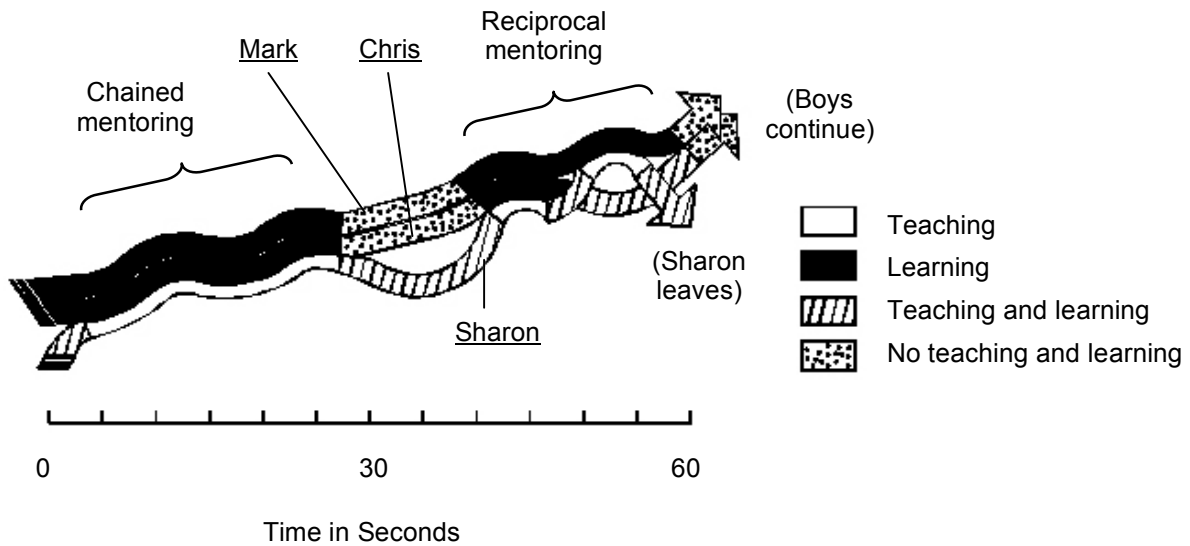


Figure 18. Mentoring as a complex series of multiple teaching and learning practices.

Teaching and learning principles other than social mentoring and modeling can be illustrated in one or more of these aforementioned visuals. For example, the principle of just-in-time learning can be represented as a short upward thrust of a learner's black learning arrow, and just-in-time teaching as a short upward thrust of a mentor's white instructional arrow. Similarly, the principle of "child initiated and controlled learning" is represented by the reciprocal mentoring illustration in which the child is visualized as playing a collaborative partnership in both their own and other's learning. The study also found that parents, siblings and friends were often working towards helping the participant become independent in their use of new ICTs. Again, the types of illustrations presented thus far can represent this move towards participant independence by drawing the mentor's instructional arrow as 'leaving' and not physically touching/interacting with the participant's learning arrow, or the mentor's arrow can leave the illustration altogether.

Finally, the majority of other principles can be included in such illustrations by labelling the arrows themselves with the particular teaching and learning principles

exhibited by learner/participant and mentor. For example, times when participants were observed to be learning by observing a mentor using a new ICT, the word 'observations' can be written in the arrow for the duration this behaviour was observed.

### **6.3.3 Representing the social interactions in an individual's development**

One of the drawbacks of Chapman et al. *Support to Independence* model is that it does not visually emphasize the role social interactions play in the participants' development. Figure 19 seeks to correct this by overlaying an example of the 'basic' mentoring graphic (Figure 12) over the Chapman model. Again, the black arrow represents the learner's (participant's) learning and the white arrow represents the mentor's instruction. Together they both reflect how the mentor helps the participant access and learn knowledge, skills and/or attitudes previously inaccessible or unknown to the participant.

Unlike the basic mentoring graphic, note how the mentor's arrow in Figure 19 travels from off the page. This is done to represent how the mentor brings his/her own knowledge, skills and attitudes from their own independent zone when teaching and helping the participant learn in the participant's learning zone. This not only reflects how social interactions between mentor and participant helped individual participants gain the necessary new ICT knowledge, skills, and attitudes, but it reflects Vygotskian and Situated Learning theory which claims these mentors also transmit the social and cultural history and practices of their community (Lave & Wegner, 1991, pp 48-51).

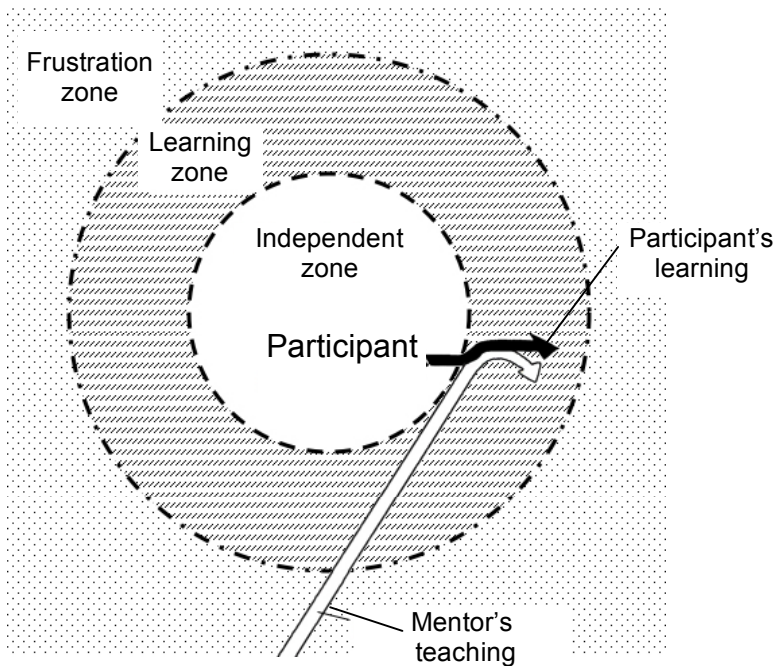


Figure 19. Merging the basic mentoring and Chapman's Support to Independence learning models.

For example, when Carmen (Chris's older sister) was teaching Chris strategies for beating a level in a computer video game (BV4.7 0:00-4:00), she was not only using her own independent knowledge to teach him required mouse skills, eye-hand coordination, and concepts of time and timing (to name only a few skills/strategies taught), but she was also unconsciously conveying her own and her family's value of home-based digital entertainment, that problem solving could involve digital technologies, and that the communication of information involved reading printed language and 'reading' multi-modal communications such as images, animations, video, sound, music, voices, and so on.

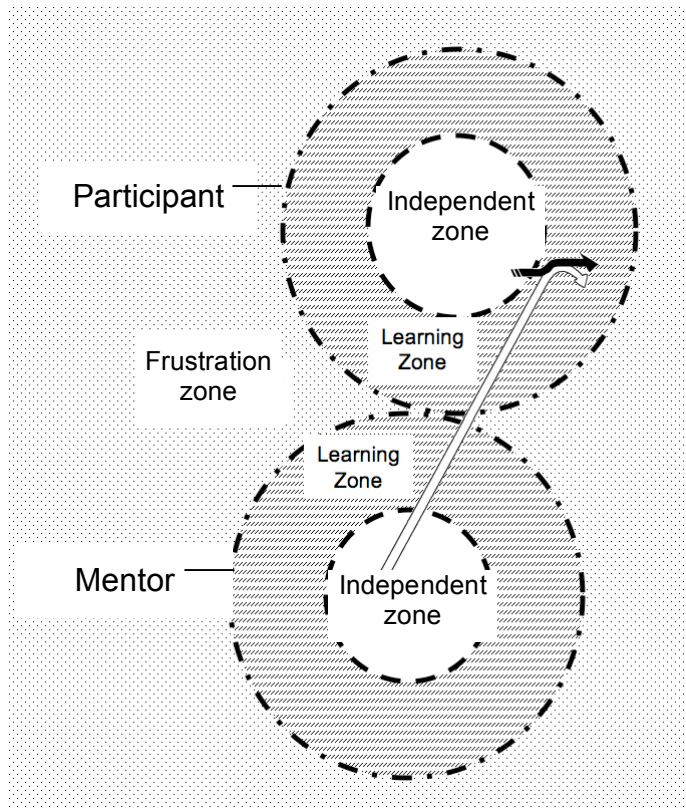


Figure 20. Individual learning as social interaction.

Figure 20 makes this connection between mentors independent zone and learner's independent and learning zones more concrete. It is important to note that for clarity purposes Figure 20 is a representation only one very simple 'basic' modeling interaction between mentor and participant. The reality of the mentoring in this study was that instruction was much more multifaceted and complex than that suggested in, for example, the one minute recording of teaching and learning practices occurring between Mark, Chris and Sharon (see Figure 18). Furthermore, such mentoring involved teaching and learning about a wide variety of knowledge, skills, strategies, social practices, communications, and so on. Additionally, sometimes subjects were observed both

working in their learning zone, or quickly oscillating between their learning zone and their independent zone. Thus a participant's mentored instruction and learning could be illustrated as occurring along multiple learning and teaching arrows representing different and changing approaches to mentoring (e.g., basic mentoring, chained mentoring, tag team mentoring, and combinations thereof).

For example, in the one minute of video presented earlier capturing socially mediated teaching and learning occurring between Sharon, Mark and Chris, Sharon teaches Mark and Chris: (a) which video games on a website are age-appropriate; (b) that being able to read is an important skill for finding and successfully playing many online games; (c) that Mark cannot have his own way on the computer when friends are over; and (d) where to click in order to get the appropriate programs up and running on the screen. Furthermore, the mentored instruction that occurs in these interactions is basic, chained, and reciprocal.

Figure 21 is a visual representation of the multifaceted nature of a mentor's instruction and how this instruction helps to eventually pull/push the boundary of a participant's 'independent zone' into their 'learning zone'. Furthermore, the division between the learners' independent and learning zones is not drawn as a perfect circle because learning to use new ICTs was observed to be an 'uneven practice' that advanced participants' skills, knowledge, attitudes, social practices, and so on, at different rates (e.g., participants may learn mouse skills at different rates on different days, depending on the design of the program being used, the context of their learning situation, their needs and abilities, and the mentor's own skill sets).

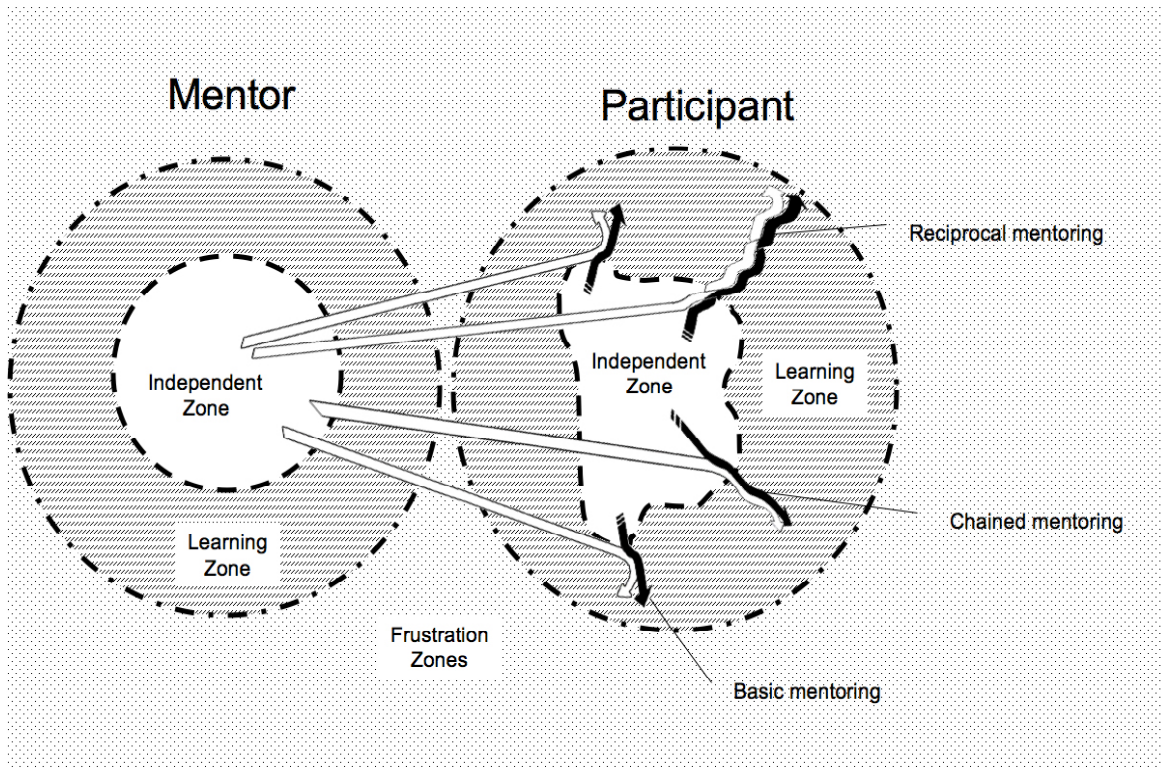


Figure 21. Participant's learning as a socially interactive mentoring process resulting in the variable expansion of the participant's independent zone.

#### **6.3.4 Toward a social 'D'iscourse representation of learning**

Subjects in this study were not only seen to use language as a means for verbally interacting with each other (e.g., speaking and listening), but that they used language alongside other social practices (e.g., acting, valuing, feeling, believing) as a way to: (a) define their social-group identities (Gee, 2009b); (b) develop "communities of practice" (Wegner, 2006); and (c) learn new 'ways of being in the world' (Gee, 1999, p. 7). More specifically, when it came to learning how to use new ICTs, participants were observed

being mentored 'offline' by family and friends, while developing the rudimentary skills required to avail themselves of mentored online learning from friends and/or family.

Understandably, because this research took place in the participants' homes, the participants' close family members were the most frequent group reported and observed teaching participants how to access and use new ICTs. However, it was also noted that alongside the skills required to use these new ICTs, parents taught children how to use the equipment safely (e.g., not sitting with the laptop behind doors), ethically (not accessing questionable content), and critically (being able to critically engage/disengage with online content). Older siblings, on the other hand, were more likely to teach participants how to access and effectively play new video games, such as Webkinz and Club Penguin. In short, and as argued by Lave and Wenger (1991), participants were not only taught the skills, knowledge and attitudes required to use new ICTs in a manner valued by the participants' families, but they also mentored participants into the family's community of learners where the family's habits of thought and action were directly and vicariously learned by the participant through demonstration and collaboration.

Participants also used language and other social practices to shape and define how they learned to use new ICTs with a second group of learners: offline friends. An example of this group of learners was repeatedly observed occurring in the daycare interactions between Chris, Mark, Sena and their friends (see section 5.1.9 in this study). In this case, the Chris and Mark were repeatedly observed developing shared experiences playing video games. Often the researcher observed both boys using gaming strategies learned at home, and both were seen helping each other bring their current knowledge, skills, and experience to bear on the game in an effort to beat the current game-level. While doing this they often included other children in the game play who offered new and different (and often successful) gaming strategies.

Sena was rarely included in the social circle of game players (the boys rarely verbally interacted with her) and it was observed that the language the boys used helped to strengthen their common experiences and solidify membership in their small daycare group of offline video players. In fact, over the duration of the study, the boys developed their own vocabulary for the *Goofy Skateboarding* game that defined how (and if) those outside this small group of children could interact with them (e.g., the researcher began to have difficulties understanding some of their computer-game language).

Figure 22 is a visual representation of the teaching and learning interactions occurring at the daycare between Chris, Mark, and a third male child (named Boy #1). However, instead of representing the complexity of teaching and learning with a large and confusing variety of mentoring 'arrows' (similar to those shown in Figure 21), the graphic has been simplified to illustrate only one basic mentoring interaction per child, and each participant's learning is represented by a dark black arrow, and the mentoring by a dotted arrow. The important information conveyed through this simplified group teaching/learning graphic is that participants not only engaged in two-way mentoring approaches to teach each other and learn from each other, but that they were concurrently creating, modifying and teaching one another new and existing language and social practices that solidified them as members of a distinct group, or 'D'iscourse community' (Gee, 1996), of young daycare video players.

Note also, that Figure 22 illustrates the independent (inner circle) and learning (outer circle) zones as being unique to each child and physically separate. In reality, these zones can be imagined as overlapping and interacting with each other. For example, video (CV3.2 10:02-23.35) captured Mark and Chris taking turns, and simultaneously, using the keyboard and mouse to interact with a computer video game and discuss strategies for overcoming new puzzles and challenges. At the point where they

simultaneously take turn using the mouse and keyboard, and verbally share strategies to help each other beat a new level of the game, it can be imagined that a great deal of their learning zones (or ZPD) and independent zones are similar and thus overlap.

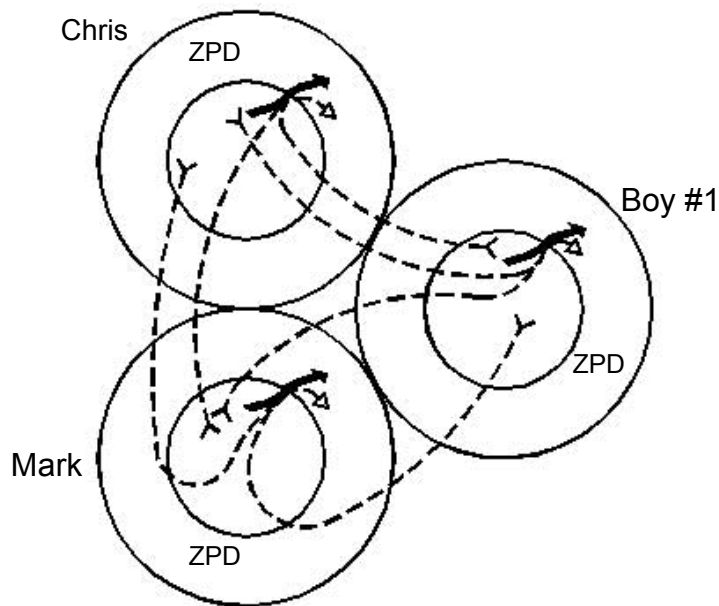


Figure 22. Participants learning to use new ICTs as a 'D'iscourse community of socially interactive mentors and mentees.

Nor was the daycare the only 'D'iscourse community in which participants mentored and were mentored into using new ICTs. As noted earlier in this section, the study also found that children learned a great deal about using new ICTs from mentored interactions with parents and siblings in their homes. Thus the home could be described as being another 'D'iscourse community through which the participant could learn to use new ICTs. Figure 23 represents how Chris could be illustrated as belonging to three distinct 'D'iscourse communities through which he was learning to use new ICTs. Again,

for the sake of clarity, the arrows representing the variety of mentored teaching and learning (e.g., basic, chained, reciprocal, and simultaneous mentoring) have not been included in this diagram.

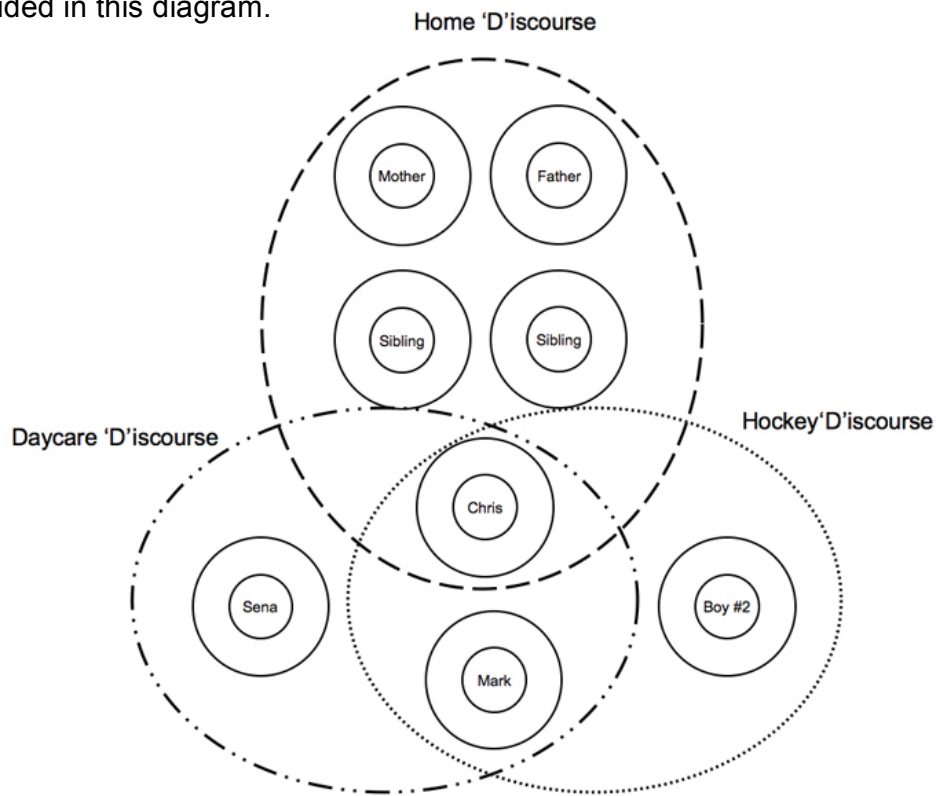


Figure 23. Participants learning to use new ICTs through participation in sets of 'D'iscourse communities of socially interactive mentors and mentees.

Finally, Figure 23 also illustrates how children in this study were observed to share skills, experience and knowledge across boundaries from group to group. For example, video captured Chris teaching knowledge to Mark, Mark's mother and Mark's sister, that Chris originally learned from his siblings (e.g., how to access and play Webkinz, how to access online hockey scores, and how to play Hot Wheels and MSN online games). Such interactions indicate that knowledge, skills, attitudes and experiences of one 'D'iscourse

group, were being shared with and taught across 'D'iscourse communities, and that both groups used similar approaches to mentoring (e.g., basic, reciprocal, and so on).

It was also observed that children were developing the rudimentary new ICT skills and communication practices characteristic of online communities. For example, Chris and Sena reported in their interviews that they had either observed their older siblings communicate with other children (often unknown children) through Webkinz and Club Penguin, or that they had heard they could use this software to communicate and chat with other children. Similarly, all of the participants had either used or were learning to use new wireless online ICTs (e.g., laptops, cell phones and palm pilots) to communicate with family and friends. This further reinforced their understanding that they could communicate and socialize 'online' wirelessly. In other words, participants seemed to be quickly and indirectly gathering the skills, knowledge and attitudes required to navigate and communicate independently in new socially networked online 'D'iscourse circles that included family, known friends, and unknown friends.

### ***6.3.5 Representing the socially distributed nature of teaching and learning***

Although children in this study were observed to be developing the knowledge and skills required to email and interact through rudimentary online social networking services such as Club Penguin and Webkinz, none were yet able to independently communicate online with others. However, it was evident through the interviews with parents, and observations of older siblings, that before these participants reached the age of Chris's oldest sister (grade five), most if not all of these 5-year-old participants would likely be independently and regularly distributing their communications to (and receiving communications from) a variety of different online groups of networked users (e.g., email distribution lists, groups of online friends, interest forums, community blogs, and social

networking sites). Furthermore, it is through these networked groups, that participants would likely further their literacy abilities while learning to use new ICTs.

However, observations on this study did indicate that participants were beginning to develop multiple Discourses in their offline worlds in a fashion similarly to that proposed by Gee (1996). For example, in Figure 24 Mark's primary (or first) discourse community is made up of his Mom, Dad, Elly and himself. This discourse community is illustrated as a fan of interconnected relationships drawn in the top left corner of Figure 25. Similarly, Sena's Mom, Dad, Hope and Sena were Sena's primary discourse community and this is represented as a fan in the bottom left hand corner. Chris' primary discourse community fan is in the top right hand corner of figure 24 and consists of his Mom, Dad, Liza, Carmen and Chris himself. But because Chris was videotaped playing video games with Mark, and Sena, Mark and Chris were observed working together at daycare and/or reported visiting

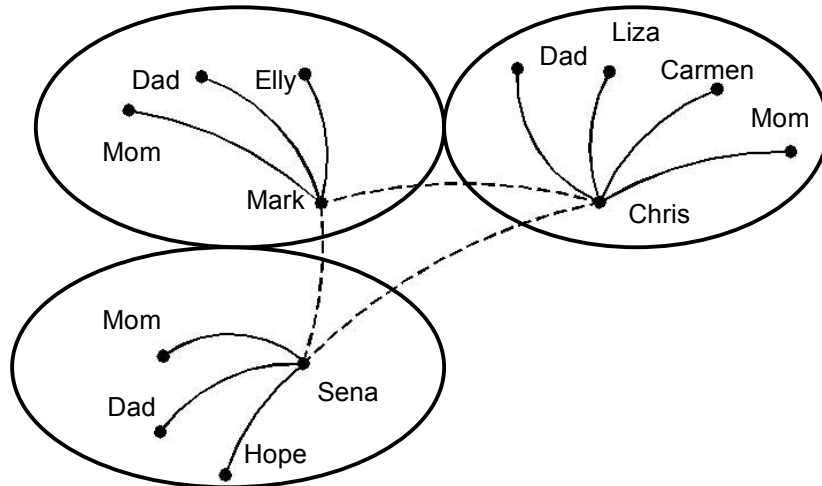


Figure 24. The growing offline network through which Mark, Sena and Chris learn to use ICTs.

each other's homes, dotted lines have been added to indicate instances where participants have had the opportunity to use and/or learn to use new ICTs with each other and begin developing a discourse community separate from their primary community

In other words, this illustration not only represents how children learn to use new ICTs within their family discourse group, but that through social interactions and conversations outside of the home (and school) students are being taught, and learning, In other words, this illustration not only represents how children learn to use new ICTs within their family discourse group, but that through social interactions and conversations outside of the home (and school) students are being taught, and learning, to use new ICTs and acquire literacy for a growing set of discourse communities in a process similar to that proposed by Gee (1996) and Nystrand (1997).

The power of this interpretive graphic is that it: (a) represents the important role families play in teaching 5-year-old participants how to use new ICTs; (b) begins to represent (with dotted lines) the developing influence friends, and friend's discourse communities, have on participants' uptake of new ICTs; (c) represents how skills, knowledge and understandings are distributed across discourse circles (again dotted lines); and (d) illustrates how the development of multiple offline networks, or discourse communities, can be viewed as precursors to future online learning and communicating networks.

#### **6.4 Chapter Summary and Chapter 7 Preview**

This chapter presented an interpretive discussion of the findings presented in chapter 5 and developed a set of contextually sensitive models representative of the participants' teaching and learning interactions and principles while using new ICTs in the home setting.

Drawing from the 16 principles of teaching and learning identified in the study, the discussion in this chapter highlighted how the majority of participants learned to use new ICTs through social interactions paralleling mentored relationships similar to those proposed by Vygotskian learning theorists. The discussion then noted that a great deal of what and how participants learned to use new ICTs did not involve reading and writing alone, but integrated these forms of communication with multimodal forms of communications (e.g., speaking, visuals, music, animation, and so on) similar to those theorized by Kress (2000, 2003) and the New London Group (1996). The discussion also noted that much of the learning was initiated and driven by the participants, and that children seemed to be very comfortable with the rapid changes in the ICTs, especially the changes in the software interfaces of the games they were playing.

Drawing upon the teaching and learning interactions observed in this study, a series of six interpretive graphics were presented. The visuals represent six different types of mentoring observed: basic, prolonged, chained/tag team, reciprocal, simultaneous, and unlearning. These representations were expanded to represent the multitude of different mentor-mentee interactions occurring in even the briefest interactions, and how these interactions helped define and shape the home 'D'iscourse circle (as well as those observed in the daycare and hypothesized outside of the participants' homes and daycares). These visual interpretations were then developed to represent how what a participant learned and taught in their home-based social group impacted (or overlapped) with 'D'iscourse practices of other out-of-school social discourse groups in which the child was a participating member. Finally, a representation for a socially mediated model incorporating the participants' developing social network skills, knowledge and attitudes was presented.

Chapter 7 presents a summary of the study's findings, explores the limitations of the study's interpretations and methods, presents implications for parents, teachers and curriculum designers, and offers directions for further research.

## Chapter 7: Conclusions

### **7.0 Introduction**

The purpose of this explorative ethnographic study was twofold. First, to access and generate layered, rich, contextualized data describing the types, patterns, and principles of new and multiple literacy learning and teaching of meaning-making practices seen naturally occurring within the homes of families whose kindergarten children (5- or 6-year-old children) regularly access and use home-based ICTs. Second, to analyze and interpret these data in an effort to develop a contextually sensitive critical interpretation of primary children's new and multiple literacies and teaching/learning practices and principles.

In pursuit of this purpose, the problem and research questions were introduced in chapter 1, a review of relevant literature framed the study's significance in chapter 2, chapter 3 described the methods for data collection and analysis, chapters 4 and 5 presented the findings, and chapter 6 presented an interpretive discussion of the findings and developed a series of contextually sensitive interpretive graphics representative of the teaching and learning occurring in the study.

This chapter presents a summary of the study's findings, conclusions drawn from these findings, a summary of the learning models developed from the findings, a review of the limitations of interpretations and methods, a list of implications for parents, teachers, curriculum designers and learning theorists, and suggests directions for further research.

### **7.1 Summary of Findings**

This section presents a summary of the findings in the order of the four research questions presented.

**7.1.1 Question #1. What home teaching/learning contexts exist for 5-year-olds learning to use new ICTs?**

The findings for this question were fivefold. First, participants had access to an average of 14 unique home-based ICTs per household (numbers of new ICTs ranged from seven to 21 new ICTs per child). However, contrary to current research that found 4- to 8-year-olds using diverse numbers of home-based ICTs (Hill, 2010), findings from this study indicated that of the 14 (on average) new ICTs accessible in the home, participants only regularly accessed computers, DVD players, and digital music players.

Second, contrary to research by Healy (1999), parents in this study were not using computers and new ICTs as surrogate babysitters. In fact, including TV, DVD, and listening to music, participants were found to spend a maximum of 13 hours a week using new ICTs. Additionally, parents were observed to regularly and actively engage collaboratively with participants in new ICT explorations, and parents ensured that their child's screen time was kept to a minimum by engaging their children in scheduled or unscheduled activities with other children that involved a range of physical exertion (e.g., soccer, hockey, dance, and so on).

Third, parents reported and were observed teaching and encouraging participants how to independently and freely access new ICTs. This finding was corroborated by video recordings. However it was also found that this open access was hindered by parents being in charge of selecting the family's canon of video games and online sites that children could independently access.

Fourth, parents self-reported that participants' time using and learning to use new ICTs, was not formally scheduled. However, it was also observed that participants' time using new ICTs was still 'scheduled' to a degree, as participants tried to fit their use of

new ICTs in between other scheduled activities and events (e.g., playing online video game between dinner and a soccer practice).

The fifth and final finding noted that while participants learned to access and use wireless new ICTs, participants were concurrently learning that information, communication and entertainment could be accessed anywhere in the home and at anytime during their free time. Furthermore, in the case of Internet-capable cell phones, participants were learning that ICT-based information, communication and entertainment extended into contexts outside their homes.

In summary, participants in this study had come to know that they could access (indeed were encouraged to access) a rich variety of new ICTs, that these ICTs gave them access to a rich source of information, communication and entertainment resources, and that they could use these new ICTs to access these resources anywhere in (and outside) the home and at varying times in the day.

### ***7.1.2 Questions #2. Who is teaching 5-year-olds how to use new home-based ICTs?***

Four main groups were identified as being responsible for teaching participants to use new ICTs. They were, parents, siblings, friends, and, to a degree, the computer itself. Furthermore, an analysis of the data also revealed four behavioural patterns observed occurring between the human subjects.

The first pattern occurred when participants required assistance in using new ICT software or hardware (whether it was assistance in using a cell phone, finding hockey team scores on a palm pilot, or getting help in solving a computer-based video game puzzle). During these instances, participants would request assistance from anyone, and sometimes everyone, that was nearby, regardless of the person's age, gender or expertise using new ICT hardware or software.

The second finding was that participants with older siblings were two to three times more likely to turn to a sibling for help than a parent. It was not determined if this was because the parent was busy with other chores, or the parent was disinterested and/or unable to engage with their 5-year-old's video games.

The third finding noted that aside from participants turning more frequently to older siblings than parents, each participant turned to very different people and groups of people when learning to use, and using, new ICTs.

Finally, it was found that when working alone, participants received a great deal of information, direction and feedback from new ICT software itself (especially computer video games), and that much of this new ICT feedback was presented to participants in a variety of multimodal communication forms (e.g., music, animation, talking avatars, timed comments, sounds, voiced commands, video instructions, and so on).

In summary, 5-year-old participants in this study learned to use new home-based ICTs through social interactions with family members and friends, and through programmed visual and auditory feedback originating from new ICT hardware and software. Additionally, participants with older siblings were observed to turn more frequently to their siblings than their parents. Finally, aside from siblings, there were few similarities to who participants tended to turn to for assistance.

***7.1.3 Questions #3. What learning and/or teaching principles do subjects demonstrate in the interactions between family members, friends and 5-year-old learners as they directly or indirectly teach the 5-year old to use new ICTs in the home setting?***

The analysis of the study's data sets identified 16 different categories of teaching and learning principles which were then grouped into the four following broad categories:

1. Participants often learned to access and use new ICTs from family members and friends through a social mentoring process similar to that proposed by Gee (1996), Vygotsky (1978), Lave & Wegner (1991), and Street (1995). Additionally when learning to use, and using, new ICTs participants often initiated the teaching/learning sessions, engaged with mentors in ways that emphasized just-in-time teaching and learning, and demonstrated five distinct approaches to modelling: basic, prolonged, chained/tag team, reciprocal, and simultaneous.
2. Data analysis determined that although children were learning to read and write printed text while learning to use new ICTs, they were also learning to communicate and make meaning using a wide variety of additional multimodal communication forms. Additionally, it was observed that subjects taught and learned how to use new ICTs through a great deal of visual communication.
3. It was found that a great deal of instruction and learning exhibited a child-centered approach. For example, participants almost always initiated when and where the ICTs were to be accessed and used. Furthermore, they regularly decided what available hardware and software was to be used, and they often initiated how it was to be used, and what content was to be accessed and explored (within the limits of the new ICT resources made available by their parents). Similarly, children were spontaneous with their selection of software and hardware, and were observed regularly constructing their informational, instructional and recreational paths when learning to use, and using/applying new ICTs skills, knowledge and attitudes (e.g., participants followed hyperlinks and clicked on objects that interested them, and in the process learned the required skills, information and attitudes to navigate their chosen paths of interest).
4. Finally, it was found that children were fairly comfortable and flexible with change both in the ICT software and hardware they were using, and the context in which they

used it. For example, participants were regularly observed using portable wireless new ICT devices and working alongside mentors, or working alone, learning the skills, knowledge, and attitudes required to independently use unfamiliar new ICT gaming software and new computer hardware. As a result, participants were observed to be comfortable using new ICTs to access, learn and communicate information, skills, and attitudes throughout the home and across a variety of different contexts outside the home.

In short, the 16 teaching and learning principles identified in this study demonstrated that teaching and learning was largely a socially mediated process, that integrated and emphasized learning and communication of a multimodal nature, incorporated child centered instruction and learning, and developed learners who were comfortable with change in both the tools and the contexts through which they learned and communicated.

## ***7.2 Summary of Interpretive Learning and Literacy Visuals***

Two types of interpretive graphics were developed to represent the diverse learning and teaching principles and patterns of interactions exhibited by and between this study's subjects. The first set of visuals was developed to visually represent: (a) how teaching and learning occurred in the participant's 'learning zone' (an area beyond the participant's independent ability to perform, know or understand, but one in which they can learn the required skills, information or knowledge through the assistance of a mentor); (b) how during these socially interactive teaching and/or learning processes, mentors 'pull' a participant's existing skills, knowledge or understandings forward, and/or mentees 'push' their existing skills, knowledge or understandings forward; and (c) how learning to use new ICTs often involved rapid and complex interactions between learner

and his/her mentors (e.g., learners and mentors were often seen quickly switching their roles).

The second set of visuals was developed to visually represent how the mentoring process helped participants develop competencies in using new ICTs, and how participants learned and were taught the cultural habits of thought and action for home and daycare 'D'iscourse groups (Gee 2009b). Furthermore, these graphics were developed into a offline network in an effort to represent the socially distributed and networked model of teaching and learning in which participants' older siblings were engaging, and which participants were observed offline to be learning the skills, knowledge and understandings required for future online networked communications.

### **7.3 Conclusions**

Six conclusions were developed from the study's findings and reinforced or further developed in the interpretive visuals. Conclusions are geared to explaining the patterns and principles of new and multiple literacy learning and teaching meaning-making practices naturally occurring within the homes of families whose kindergarten children regularly accessed and use new home-based ICTs.

First, it was found that 5-year-old children learned to use new home-based ICTs largely through social interactions with parents, siblings and friends. The social interactions paralleled mentored learning processes theorized by Gee (2009b) and Vygotsky (1978), and suggest that learning is situated in communities of practice (Lave & Wenger, 1991) rather than within the heads of individuals.

Second, it was established that learning to use new ICTs rarely occurred solely through the modes of reading and writing. Instead, children learned a great deal by observing mentors' highly visual explanations, and listening to these mentors' verbal explanations. Moreover, children also unconsciously became aware that being able to

receive and send messages (becoming 'literate') involved becoming literate across a wide range of multimodal communications including animation, digital voices, video, printed text, and "...image, gaze, gesture, movement, music, speech, and sound effects" (Kress & Jewitt, 2003, p. 1).

Third, much of children's instruction and learning occurred through unstructured child-initiated and child-controlled explorative play. Additionally, children not only chose the content they wanted to access and learn, but parents gave participants great flexibility regarding when and where this access and learning took place. Unlike the rigidity of the elementary school context in which learning was found to be "imposed and compartmentalized and governed by rules" (McTavish, 2010, p. 262), a great deal of instruction and learning in this study was initiated, motivated and sustained by the 5-year-old child, was structured by few rules, and involved authentic, meaningful and shared social interactions.

Fourth, the process of learning to use new ICTs to communicate and learn was observed to develop attitudes in participants that made them accepting and flexible with changes both in the tools they used and their communication contexts. Unlike the relatively established and stable format of print bound books, children in this study were learning how to use new ICTs and develop literacy using tools that were going through rapid changes (e.g. Club Penguin gaming environment had changed significantly twice during this study). Similarly, participants were accustomed to accessing mobile ICTs (especially cell and smart phones) and communicating in a variety of contexts both in and outside the home, and participants regularly demonstrated constructivist approaches to learning as they followed new and different hyper links when accessing, using and exploring new ICT software (especially Internet games).

Fifth, contrary to views that young children's use of new ICTs was responsible for developing sedentary activity habits and introverted social skills, participants were observed engaged with mentors in highly social and physically close interactions that included gross kinesthetic movement and musical engagement. For example, participants in this study were repeatedly videotaped dancing, singing, laughing, and sharing their new ICT experiences and doing so in close physical contact with each other. Furthermore, findings indicated that for approximately 70% of the video, participants used and learned to use new ICTs through social interactions with one or more family members and friends .

Sixth, literacy development and learning through the use of new home-based ICTs were observed to not only be responsible for mediating and consolidating communities of participants in 'close' physical settings such as participants' homes and daycares (Lave & Wegner, 1991), but they also enabled participants to develop the skills, knowledge and understandings required to begin moving towards joining often bigger 'D'istributed digitally networked communities.

#### **7.4 Limitations**

Although the study's small sample size afforded opportunities to collect detailed observations and descriptions of the participants' behaviours and actions, the small sample size also meant that the findings could not be generalized to wider audiences. For example, this study can not be said to be representative of all family member configurations because there were no grandparents, uncles, aunts, adopted children, foster children, single fathers, and combinations of these and other family members represented in the data. Additionally, because families were selected specifically for their self-reported use of new ICTs, families with vastly different new ICT usages (e.g., minimal use of new ICTs) may not be represented.

A second limitation of this study arose from the researcher's inability to easily isolate participants' *learning* behaviors from *usage* behaviours. For example, when a participant was videotaped collaboratively playing a video game with a sibling, (in which there was obvious audio-visual feedback coming from the computer, and in which the siblings were voicing gaming tips to each other) it was difficult for the researcher to separate behaviours representative of participants' "usage" (or application) of mastered gaming skills and strategies, from behaviours representative of participants learning and/or teaching each other new gaming skills and strategies. As a result, it must be noted that the reported times participants spent learning to use new ICTs (and family or friends spent teaching participants to use new ICTs) also included time participants spent using new ICTs. Consequently, the reported 'learning' times can only be viewed as estimates.

Finally, methodological limitations were presented in section 3.7 under the title, 'Limitations of Research Design'.

## **7.5 Implications**

Numerous implications arise from the findings and interpretive graphics presented in this study. The following discussion reports implications relevant to educators, families, curriculum developers, educational administrators, and literacy and learning theory.

### **7.5.1 Implications for educators**

Multiple implications arose for educators out of this study's findings and conclusions. The first implication originates from the stark contrast between the traditional "teacher-centred" autonomous models reported to be the foundation of the majority of teaching and learning occurring in today's elementary classrooms (Kohn, 1999; McTavish, 2010), and the learner-centered socially mediated model of teaching

and learning demonstrated in the patterns of teaching and learning interactions exhibited between participants and their families and friends in this study. According to Heath (1983), when teachers overlook and/or do not make an effort to understand and incorporate students' unique culturally situated communication and meaning making practices in the classroom (such as those demonstrated by participants learning to use new ICTs), teachers run the risk of alienating their students, reduce students' ability to make meaning and communicate effectively, and drastically compromise a child's ability to succeed in school.

More specifically, the researcher argues that teachers of these five participants run the risk of marginalizing these participants' meaning making practices, and/or compromise these students' success in school, by not taking the time to identify and design authentic learning opportunities that incorporate more of the participants' out-of-school literacy, meaning-making and communication practices – especially those exhibited by participants while learning to use and using new home-based ICTs. These are practices which the participants spent up to 25% of their week learning and applying. These are practices which engaged participants in socially mediated and student-centred teaching and learning. And these practices were reflected in the 16 teaching and learning principles exhibited in this study (such as student centered learning, socially negotiated teaching and learning, just-in-time teaching and learning, play-based learning, distributed and open access to resources, mentor-based instruction, and use of multimodal communications).

Following Heath's argument that educators need to incorporate more of students out-of-school meaning making practices in the classroom, it can be argued that learners similar to participants in this study should be given regular access to new ICT hardware and software reflective of that found in their homes. However, the reality may be that a

school has limited or no access to this equipment. What can an educator do in this situation?

First, it is important to note that only two of the 16 principles of teaching and learning identified in this study focused on access to new ICT hardware and software. Fourteen principles focused on the social and behavioural aspects between participants and their family and friends. Many of these principles can be taught with limited, infrequent, and even no access to new ICTs. For example, possible learning activities not requiring access to new ICTs, but which encourage young children to engage in, for example, more student-centred and socially mediated literacy and meaning-making practices, might involve: group work, peer editing, co-operative sports, cross-grade mentoring, reading with buddies, student designed projects, sibling apprentices, peer evaluation, and group evaluation. Additionally, the design of more assignments that encourage small group work, collaborative writing, and problem-based projects will allow participants to make meaning in social settings and using social skills similar to those learned at home while using new ICTs. The key here is to acknowledge that although new ICTs do enable children to communicate and learn in some ways that are different than traditional approaches to teaching and learning (e.g., easily creating multimodal multimedia presentations), a limited access to new ICT resources does not need to hinder a teacher's incorporation of teaching and learning principles and practices already familiar to their students.

However, if the educator does have access to a school's new ICTs (like the school's computers), some learning activities and instructional contexts that allow students to engage in familiar and new ICT-based communication and meaning-making experiences might include: collaborative wiki and blog design, development of multimodal presentations, and collaborative video game problem solving.

In order for teachers to incorporate pedagogical innovation (such as using new ICT hardware and software, and developing a more student-centred and socially mediated model of instruction in their classroom), teachers must also be ready to embrace change. In this case, change involves teachers not only taking the time and energy to learn to incorporate 'tangible' changes (e.g., learning the steps for accessing, communicating and making meaning through the use of new ICT hardware/software) but they must also incorporate 'intangible' change by concurrently moving away from a more teacher-centred autonomous model of learning towards a student-centred constructivist model of learning.

This foundational shift in learning theory is the basis for this study's second implication. According to Richardson (1990) and Lyons (2010), in order for teachers to identify, understand, and embrace different and more effective teaching practices, such as those proposed by Heath (1983), these teachers must incorporate a reflective approach in their own teaching. Richardson contends, that teachers who: (a) regularly and reflectively examine the learning theory guiding their practice; and (b) challenge it against theory underlying different teaching and learning practices (especially research into the theory and practice supporting effective teaching and learning), give themselves the opportunity to re/situate their instructional practices and student learning in more engaging, meaningful and relevant learning activities. In short, for teachers to incorporate more effective teaching and learning principles and models presented in this and similar research studies, teachers must also be prepared to develop a reflexive approach towards the critical examination and development of their own teaching/learning theory.

A third implication is drawn from the finding that some of the participants' teaching and learning practices 'overlapped' across learning communities. For example,

two participants were observed playing a video game on a computer in their daycare 'learning community'. During their time together, they were observed teaching each other how to play a new video game using video game skills and strategies previously learned in their respective home 'learning communities'. The implication of this finding is that teachers can strategically plan to teach skills and strategies to students within the school's learning community knowing that children will likely carry these across to their home and other learning communities and vice versa (especially if it is a skill, strategy, segment of knowledge, or attitudes found to be valuable by members in the other community). An example of such a strategic plan may involve the teacher contacting the child's parents to determine what new ICTs are being used, what skills, knowledge and understandings are being developed, and which ones may be taught or reinforced at school in order that the child can use them more effectively and safely.

Not only does this finding affirm the importance of teachers maintaining close connections with students' parents and home contexts (Vonda, 2007), but it emphasizes the important role teachers must play in working with parents in teaching and/or further developing learning and literacy strategies relevant to the reality of young children's new ICT-based learning contexts. For example, some parents in the study were concerned about their child's ability to critically engage with inappropriate online content. Working with parents, teachers could take the initiative to teach children the skills, knowledge and attitudes necessary to protect themselves when accessing information and learning online, and these skills could be reinforced and extended with home-based learning activities.

A fourth implication arises from the finding that participants had become accustomed to teaching, learning and communicating using a wide variety of modalities such as video, photos, music, sounds, animation, text, colour, oral interactions, writing,

physical movement of the mouse, singing, and dancing. Indeed, the most common mode of instruction in this study did not involve print. Instruction was largely delivered through visual modelling and to a lesser degree through discourse. Mentors used their voice and visuals in the new ICTs to make a point and/or demonstrate required skills, information and understandings.

Similar to research that found elementary children received greater and more diverse opportunities for engagement with information literacy genres and learning practices at home than at school (Flewitt 2006; McTavish, 2010), participants in this study learned to use and made use of a wider variety of communication modalities while using new home ICTs than that which could be experienced solely through learning to write text and read print-bound books. Although this study did not seek to compare the participants' home contexts to their school contexts, current research and discussion papers are exploring how new technologies can, and are, helping learners traverse and collapse traditional institutional boundaries through the re/design of new multiple modes of communication that reduce the authority of printed text (Gee, 2004; Kress, 2003; Lam, 2006; Leander, 2001; Sefton-Green, 2006).

Teachers who wish to engage children in multimodal teaching and learning similar to that demonstrated by participants and subjects in this study, will need to be tenacious in their search for ways to afford new ICT resources. They must also become comfortable with student centered and controlled learning, and actively seek out training that will help them design and incorporate learning activities that encourages students to work across multiple modes of expression, communication, and meaning making (Jewitt, 2006).

Finally, teachers need to be aware that although this research recommends they incorporate more of the student's unique communication and meaning making practices

in the classroom (especially those which promote principles of teaching and learning observed in this study), these inclusionary steps must be done in a well thought out and sensitive manner so that children do not feel teachers are co-opting their non-school identities and literacies (Au & Raphael, 2000). Similar to situations where preteens and teens use “inappropriate visual rhetoric” as a method of making their MySpace and Facebook pages ‘ugly’ and thus “keep ‘adults’ away from the students’/users’ online spaces where they ‘live’ (Komarenko, 2007), teachers need to respect the complex relationship between a young child’s identity and their non-school literacies. Since literacies are closely associated with power, attempting to bring nonmainstream or nonschool literacies into the classroom without sensitivity has a very real potential of making students feel that the teacher is wielding power in an effort to co-opt not only their communication technologies, but to also invade, shape, and marginalize their intricately connected and situated social contexts of space, identity and power.

### ***7.5.2 Implications for families***

As was demonstrated in this study, participants spent approximately one third of their available time learning to use computers on their own. Additionally, older siblings were observed to engage the most frequently with participants when teaching their younger siblings how to use new ICTs and in helping participants develop the associated literacies and multimodal discourses. Participants without older siblings relied more on their parents and friends when learning to use and using new ICTs, and on average spent more time learning the required skills, knowledge and attitudes on their own.

The implication of these findings for families providing their 5-year-olds and older siblings access to new ICTs (especially new ICTs that access online materials that are not vetted), is that parents need to be more consciously and actively involved with their

children's interactions with new ICTs. This not only helps parents further their own skills in using new ICTs, but it also provides multiple opportunities for parents to play a more active role in helping their children develop the appropriate skills for engaging independently and critically with content accessed using new ICTs. For example, one parent noted that their child accessed 'questionable material' while surfing the Internet with friends, and that this had spurred her on to teaching her 5-year-old how to surf the Internet more responsibly. She also noted that this instruction had occurred much sooner in the child's development than expected she felt that this had occurred because her son had relatively free access to new online ICT resources.

### ***7.5.3 Implications for curriculum developers and administrators***

The first implication for curriculum developers and administrators arises from the finding that participants in this study were not given access to the school's new ICTs. If early primary educators (kindergarten and grade one teachers) take the findings of this study to heart, then there will likely be even more pressure than there already is on the meagre ICT training and ICT resources available to educators. Administrators in particular will have to do some very creative lobbying, budgeting, and resource scheduling to meet such potential demands, and they will need to spearhead explorations into cost effective methods for more efficiently and effectively training teachers and sharing new ICT resources in the school.

The second implication also arises from lack of access to the school's new ICT resources. Without access to the schools new ICT hardware and software and access to teachers capable of designing learning opportunities that engage the teaching and learning principles identified in this study, participants would likely continue to: (a) learn the mastery of reading and writing in a similar fashion to that taught in most classrooms (Kohn, 1999), (b) be afforded less rich engagements with multimodal forms of learning

and communication (McTavish, 2010), and (c) may have reduced the teacher's ability to, as Heath (1983) would state, "construct curricula from the world of the home to enable students to move to the curricular content of the school" (p. 340). Administrators and curriculum designers, therefore, have a role to play in ensuring that school and provincial/state policies not only provide teachers with the tools to provide access to new ICTs, but that teachers are adequately trained to independently develop curriculum that takes into account the diverse approaches to learning and communicating that participants, and all children, bring to classroom.

The third implication for administrators, curriculum developers and teacher trainers is to continue supporting and examining research that investigates which out-of-school literacies are powerful and appropriate for these 'New Times' (Luke, 1998). Although many of the principles in this thesis are not new to educators (e.g., Vygotsky's suggestion that most learning is socially mediated through a style of mentoring), administrators must continue to keep abreast of this research in order to accumulate the knowledge and perspectives required to decide, for example, when, how and to what extent out-of-school literacies can and should influence the direction of school curriculum. For instance, deciding when, how and to what extent this study's just-in-time learning and instruction can be incorporated into the classroom - or whether it should it be at all - must be examined thoughtfully by administrators and in light of educators' demands (e.g., Case, 2005; Paul, Elder & Bartell, 1997) for curriculum that helps students develop the ability to methodically, thoughtfully and independently make critical judgments and take informed action.

A fourth implication is that curriculum developers will also need to consider the very complex task that faces them when designing and/or redesigning curriculum that incorporates one or more of this study's 16 teaching and learning principles. For

example, the inclusion of a multimodal approach to learning and communication in curriculum requires developers to not only reconceptualize and design curriculum that affords a more holistic and integrated approach to multiple forms of expression, communication and meaning making, but they must also take care in making design decisions knowing that each curriculum learning resource shapes knowledge in very different ways and provides teachers and students with varying degrees of learning and communicating 'affordances and resistances' (Jewitt, 2008).

As well, curriculum developers and administrators will need to work closely with researchers and teachers in designing and implementing research that examines how pedagogical and curriculum choices and configurations of old and new principles and practices may systematically favour particular patterns of meaning making, interactions, and artifact production over others. For example, if society deems it valuable to give equal emphasis to the instruction of textual alphabets and sensory alphabets (Marcus, 2009), whose repertoire of ways to design, symbolize and communicate meaning will this favour and who will this place at a disadvantage? What happens to blind learners who, for example, can read text through touch, but can not 'read' newly designed curriculum involving color, soundless movement, and light through sight? Additionally, curriculum designers will need to deal with related questions, such as, how many modes can be realistically incorporated into the curriculum, and who decides what is valuable to teach?

A fifth implication for administrators and curriculum designers develops from the principle that a great deal of the participants' learning and communication was conducted in a social setting. For example, participants regularly asked older family members and friends for assistance, and enjoyed spending time using new ICTs in close physical proximity playing, working, solving problems, communicating, and

learning together. Additionally, participants were observed sharing skills, knowledge and attitudes across discourse groups (from home to daycare), and through these social interactions were rapidly developing the social skills, knowledge and attitudes required to access and participate in ICT-based online network groups.

However, in contrast to the highly social nature of the learning context, much of the evaluation and assessment and reporting of student learning is individualized and still largely focuses on an individual's attainment of the knowledge, skills and understandings (usually reading, writing and math) as outlined in federal and provincial curriculum (e.g., British Columbia Ministry of Education, 2010; Caffrey, 2009). Although it is necessary and important to assess children on an individual basis, results from this study indicate that administrators and curriculum developers will need to more seriously consider the impact that collaboration, cooperation and socially distributed teaching and learning will have on curriculum design, implementation and resources. At the very least, it will bring attention to the need for the development of curriculum that helps students learn the skills and knowledge to effectively design and communicate in collaborative situations (e.g., collaboratively designing, writing, and presenting a multimedia report), and to develop authentic assessment that promotes growth in such social learning situations.

Sixth, several of the teaching and learning principles presented in this study create enormous implementation questions and challenges for administrators, curriculum developers, and teacher themselves. For example, it was found that all of the participants learned to use new ICTs through highly social small group mentoring interactions, and that a great deal of learning and teaching occurred just-in-time (information was given by the mentor or computer just before the participant needed it or just after they requested it). These findings parallel similar learning and literacy theory

and research suggesting that effective learning incorporates dialogue, mentoring, and regularly provides learners with immediate feedback (Brown, Collins, & Duguid, 1989; Gee, 2004, 2009b; Lave & Wegner, 1991). In this case, the challenge for administrators, curriculum designers, teacher-educators, and teachers would be to develop policy, procedures and training geared towards successfully translating observed very small group out-of-school practices observed in this study, to 20 or more students and one teacher operating in a medium sized classroom.

For example, in recordings of some participants' home-based video game play, it was found that a mentor's just-in-time oral instructions and the computer's auditory feedback were issued freely and regularly. However, in a class of 15 to 20 kindergarten students working in current school lab-type contexts, the cacophony of auditory feedback coming from 20 computers and 20 children would likely be far too distracting and overwhelming to be representative of an effective learning environment for a class of kindergarten children or their teachers.

Understandably this situation can be diffused through the liberal use of headphones, however it does raise the very real implication that administrators must be ready to work with teachers in acknowledging the many strengths and limitations of new ICTs, and to help teachers come to know how and when to use, and not use, new ICTs. Additionally, administrators must also support the strongly held conviction of some teachers that the school is uniquely positioned to offer students access to a wide variety of learning resources regardless if the tool is a new ICT or not. This means supporting educators who consciously make the decision to offer students access to nonscreen mediated tools and learning experiences in an effort to offset the seemingly ubiquitous barrage of screen-based new ICTs found in many North American homes.

A seventh and final implication is that it was found participants regularly used computers to access and surf the Internet both on their own, and with friends and/or family. Indeed parents reported openly encouraging student access to the Internet. Faced with the knowledge that such students are coming to school knowing the rudimentary skills for accessing and engaging such vast amounts of information, and are learning to communicate (and learn) through new ICT multimodalities, administrators and curriculum developers will need to work in tandem with all school stakeholders in determining what information skills and understandings are valuable and important to teach, and what needs to become mere convention and/or historical artifact (Hull & Schultz, 2001, p. 603). For example, curriculum developers may wish to spend less time having children learn traditional canons of information (and traditionally dominant communication forms such as reading and writing) and instead focus more on helping children develop the skills for independently, safely and critically accessing, assessing, selecting, and communicating relevant information.

#### ***7.5.4 Implications for literacy and learning theory***

For this discussion, the researcher returns to the three theoretical frameworks framing this study and introduced in chapter 2 (sociocultural learning, situated learning and New Literacy Studies). The following discussion examines how the study's findings have consolidated and furthered these theoretical frameworks.

A sociocultural view of learning and literacy development seeks to understand and explain literacy development and learning as a result of social interactions, shared activities, and cultural practices. In this perspective, people and their tools are key features of the learning environment. Also key to this theory is the belief that children not only learn skills, knowledge and attitudes from others during social exchanges in social contexts, but they also appropriate the actual means and tools of interaction (e.g.,

gesture, language) and internalize and transformed them so they become the cognitive tools for knowing, thinking, and acting (Renshaw, 1992; Wertsch & Sohmer, 1995).

Seen through this theoretical lens, this study's participants were regularly observed learning to use new ICTs through social interactions with peers and family. Not only did participants learn to use new ICTs but they also demonstrated the internalization of gestures and language specific to their home and daycare discourse group's existing cultural practices.

Furthermore, students also learned new ICT skills, information and understandings during social interactions with mentors. In these instances interactions supported classic sociocultural learning theory proposed by Vygotsky (e.g., mentoring involving 'More Knowledgeable Others' and learning occurred in the child's 'zone of proximal development'). Consequently it can be concluded that the findings in this study both confirmed and extended the general applicability of sociocultural learning theory into the home context where participants and their family and friends taught each other and learned from each other how to use new home-based ICTs (and to a lesser extent, new ICTs in their daycare).

However, it is also important to note that it was found that participants' use of multiple communication and meaning making modes challenges the fairly monomodal Vygotskian belief that language (reading, writing, speaking, listening) is the main semiotic tool humans use (in tandem with thought) to create meaning and make learning possible. Instead, data presents a more pluralistic interpretation of the construction and negotiation of meaning, suggesting that,

...language is only one tool in a range of human semiosis, and that individuals' choices of semiotic modes are motivated by a complex web of interconnecting personal, institutional and social factors. (Flewitt, 2006, p. 46)

Situated learning (SL) theory finds its roots in sociocultural theory and places an emphasis on understanding the influence context has on human learning and literacy development. For example, Lave and Wenger (1991) and Wenger (2007) propose that learning occurs within 'communities of participants' and that these communities not only consciously and unconsciously share available technical knowledge, tools and tasks during social interactions, but they also teach and learn through a system of self organizing social interactions and relationships that develop a common identity and set of shared 'social capital' (Bourdieu, 1986). In essence, SL theorists view learning as situated in the activity, culture and context in which it occurs, and they reject learning activities that focus on teaching abstract and decontextualized knowledge.

In this study participants were observed not only learning the concrete skills, knowledge and understandings required to operate the new ICT hardware and software, but they were observed sharing experiences and developing and reaffirming values that helped them shape their identity as a member of their family 'community' and their daycare 'community'. Although there were many new ICT tools and skills, and cultural practices and interactions (e.g., teaching and learning principles) that were common or similar between home and at daycare, it was also observed that children also organized interactions and used language and gestures at daycare that were different to those observed at home. For example, at home language was used to share information in a mainly inclusive fashion, whereas, language at daycare was used both in an inclusive and exclusionary fashion. In this manner, findings from this study support SL theory that learning was focused around learning concrete skills, knowledge and understandings that participants organized themselves through social interactions, and that it was situated in the activity, culture and physical context in which it occurred.

SL theorists, Lave and Wenger (1991), also presented a model of 'peripheral participation' that was substantiated in this study. They argued that a great deal of a new member's learning is accomplished unconsciously, and through 'newcomers' observing the actions and habits of 'old timers'. It is through such learning that newcomers move from the periphery (or minimal participation) to the centre (or maximum participation) of knowing about and engaging with the community's cultural practices and valued activities. Additionally, Lave and Wegner note part of a learning community's growth involves change in everyone. For example, old timers can learn from newcomers, especially if the newcomers bring skills, knowledge or understandings that the majority of group members deem valuable.

This theory of peripheral participation was also evident in this study. Children were regularly seen observing - some would say staring - at the screen while a parent or friend or older sibling demonstrated and explained what had to be done in order to master the required new ICT skills, strategies, knowledge and understandings. Parents also reported that when participants were preschoolers they had participants sit on their lap and the participant just observed then tried what the parent did. Participants in this study literally mimicked their mentors' actions, while discussing extensions and applications of what was learned, and asking additional questions. Confirming SL theory, participants unconsciously and consciously learned to use new ICTs largely by watching more competent others as they used the tools and enacted and embodied the cultural expectations, social capital and communities of practices similar between, but also unique to, the participants' home and daycare contexts.

Participants not only demonstrated this move from the periphery to the centre of their community of participants, but they also demonstrated how newcomers shape a community's practice. For example, one parent noted in their final interview that their

child's new ICT abilities were increasing so fast that they believed their child would be soon troubleshooting the family's home technology problems.

Finally this study was situated in New Literacies theory which proposes that current literacy practices (and meaning-making practices) are grounded in social interactions (Lankshear, 1997) and are defined by rapid changes in the numbers and types of communication forms and meaning making practice with which one can access, produce, share, and interact (Leu, 2001). Such changes are made even more possible by rapid developments and reconfigurations of new ICTs (but not limited to new ICTs) and which enable people to learn and design communications that employ multiple modes of representation (Kress, 2003; Lankshear, 1997). Such changes also encourage the development of literacy and learning practices emphasizing social collaboration, the distribution of information (and skills and understandings), and a culture of active participation (Jenkins, 2006).

Many of the practices indicative of the 16 teaching and learning principles reflected New Literacy theory. For example, it was observed that participants learned to become comfortable with change by accessing new ICTs in changing contexts (e.g., using cell phones inside and outside the house), and in the rapid changes in the hardware and software they were using (e.g., changes in the participants' Webkinz website and rapid changes in cell phones). Children were also observed learning to use and using new ICTs through multimodal communication (e.g., mentors used multimodal communication forms to demonstrate how to accomplish something on the computer). Finally, participants were observed developing the skills, knowledge and understandings that would enable them to engage in future communications that emphasized the distribution of information (e.g., they shared new ICT skills, information and

understandings through face to face networks as opposed to digital networks and spaces).

One area of New Literacies Theory that was not supported in this study was the belief that new ICTs encouraged users to be more active participants in what Jenkins (2006) called a 'participatory culture'. That is, instead of being individuals who are mainly concerned with the consumption of goods and services, people who use new ICTs (especially the Internet) learn to produce and share contributions with society and "creatively respond to a plethora of electronic signals and cultural commodities in ways that surprise their makers, finding meanings and identities never meant to be there and defying simple nostrums that bewail the manipulation or passivity of 'consumers'" (Willis, 2003, p 392). Whether due to the child's age, interests, access to appropriate online social networks, or other reasons, children were not observed actively designing, creating, producing, or sharing cultural commodities. In fact, they were observed doing the opposite on sites like Webkinz and most arcade games where they were observed 'consuming' or using the video games as presented and learning how to consume products in a virtual world. Combined with findings that indicated parents did not take an active role in actively developing their child's ability to critically engage with content while using new ICTs, one important cause for concern is the impact that such passive reception and consumption of online messages, values, and communications will have on these children's learning, literacy and future social, ethical and cultural development.

### **7.6 Further Study**

As is the case with much research, more questions were raised in this study than were answered. The following are questions and potential directions that may be useful for shaping future research agendas.

One of the purposes of this research was to describe the teaching and learning practices and principles of 5-year-olds and their families and friends while using new home-based ICTs. Therefore, it was decided to select and study a small sample of children who were already known to engage with new home-based ICTs. Future studies could engage larger sample sizes to answer the question, 'Can these findings can be generalized to more diverse populations and contexts'?

This study focused on researching and presenting descriptions of 16 different teaching and learning principles common and specific to most or all of the five 5-year-old participants' home-based ICT teaching/learning experiences. Future explorations could explore: (a) the extent that these and other home-based teaching and learning principles and practices are present in 5-year-old's schooling experiences; and (b) the number and types of new teaching and learning practices unique to the home and school communities.

Additionally research into the similarities and differences between the teaching and learning principles and practices exhibited by participants in their home and school discourses, could also determine: (a) the most effective methods teachers could employ for incorporating such principles and practices into their own classroom (or if it is possible for teachers to do this or not); (b) the impact that the conscious incorporation of such principles and practices would have on children's success in (and out) of a school.

Chapter 6 presented interpretive visualizations and discussions into participants' unique and shared teaching and learning experiences exhibited in two different discourse circles: home and daycare. For example, it was noted that new ICT skills that two participants learned at home were being shared and in some cases applied during their daycare experiences. Future research can explore and make clearer the dynamics occurring in these across-community-boundary resource-sharing learning and

communicating events, in an effort to make schooling more authentic and relevant to students' lives.

Findings from this study also indicate that children were being taught and were learning to use new ICTs through a variety of multimodal communication forms. For example, it was observed that participants learned a great deal by observing and conversing with more ICT-capable family members and friends, and that participants received a great deal of feedback in the form of music, animation and sounds when using and learning to use screen-based new ICTs.

Participants' regular engagement with multiple learning and communication modes raises important questions for research such as: How do teachers and parents (who may have learned to use, and still rely on using, a fairly restricted and 'monomodal' approach to communication and learning) teach children how to effectively communicate and learn using multimodal forms of communication? Furthermore, if multimodal communication and instruction are encouraged in early grades, what design principles need to be clearly developed to encourage student growth? How do curriculum developers facilitate the move from monomodal to multimodal approaches to learning and communication? Finally, how does the current monomodal form of curriculum and educational policy shape the way pedagogy is activated and how would a change to a multimodal form of educational curriculum and policy impact practice?

It was also found that when learning to use new ICTs, much of the instruction was initiated and mediated through participant's interests and choice, and that it occurred in settings where the participant was regularly the only learner and where mentors often provided information and answered the learner's questions just-in-time. The idea that effective instruction should be more student centred (e.g., Kohn, 1999; McTavish, 2010) and more promptly meet the learner's needs (Gee, 2004) is not a new

concept. However, imagining how these practices might be leveraged in the classroom raises more questions for further research, including: How can current classroom designs and resources be adapted, redistributed or reconceptualized to overcome the current one-teacher-to-20-students configuration? What type of learning occurs through ICT-based just-in-time instruction, and does this type of learning encourage thoughtful and critical habits of mind and action? Also, how can new ICTs be used in the classroom to promote student centered learning?

Parents reported that participants seemed to be developing a high comfort level with the rapid changes occurring in the software (and to a lesser extent the hardware). This was also noted by the researcher in his field notes (TN04 05/14/2008), and is reflected in literature investigating the highly situated, diverse and rapidly changing nature of information, ideology, and materials occurring in situations ranging from local to global contexts (Kalantzis, Cope, & Harvey, 2003). Future research can explore children's level of comfort with rapidly changing communication technologies, and the effect this comfort level has on their own abilities to design/redesign new forms of communication and approaches to learning (such as the collaborative construction of shared understandings and meaning making practices possible in collaborative and wiki design and communication). Future research can also investigate the implications that this increased comfort level has for educators and school systems who can not, and/or choose not, to keep pace with the rapid changes in software and hardware. Finally, what would a model of teaching and learning need to incorporate when embracing such change?

Interestingly, this study also found that participants were more likely to turn to older siblings than parents when learning to use and using new ICTs. This raises the question why is this so, and what differences might there be between the teaching and

learning that occurs between young children and different types of mentors? Future studies could shed light on this situation by descriptively comparing and contrasting the instructional approaches between participants and different mentors (e.g., participant and parent, participant and sibling, participant and friend, and so on), and by comparing and contrasting the skills, information and attitudes taught and learned in each pairing. Such information would help teachers and parents become more aware of the skills (especially critical thinking skills), knowledge and understandings that needed to be emphasized with young children at home and at school, and who would be best to help teach them to young children.

Not only were 5-year-olds in this study early adopters of new ICTs, but they were also observed rapidly learning to use newly acquired and purchased ICTs, and learning how to use new features on existing ICTs. Future research could more closely examine the depth to which these new ICTs and new literacies are adopted by young children and the level at which new ICTs are being taught by early educators. Such research would help curriculum designers develop curriculum that was more relevant to learners' abilities and needs (e.g., teaching participants in this study how to use a mouse and keyboard would prove to be redundant) and help teachers sidestep the problems associated with teaching new literacies that are not new to young children at all (Lankshear & Knobel, 2003a).

This study also determined that computers played a role in helping children learn and reinforce the skills and knowledge required to use specific software. Future research could also explore the potential for computers to act as 'teachers' by researching the differences and similarities between the teaching and learning principles exhibited between human subjects, and humans subjects and new ICT software and hardware. It would be particularly interesting to explore how new ICT software and

hardware replicates the social dimension of human learning and teaching. This is especially so since this study corroborates a large portion of learning theory (Gee, 2003) which suggests computers can do some 'teaching', and research that finds children can learn to use new ICTs through a self directed trial and error discovery approach with no initial intervention from more capable others (Mitra, 2003; Mitra & Rana, 2001).

Finally, it was found that approximately 30% of video captured participants using the computer alone, and in one case one child had accessed content that their parent had deemed inappropriate. Future research could explore the sites young children are exploring on their own, or with peers, in an effort to develop curriculum that would help parents help their children, and children help themselves, navigate their online experience in a more safe and responsible fashion.

### **7.7 Summary**

This ethnography presented and interpreted findings that described the teaching and learning principles inherent to the behaviours of 5-year-olds learning to use, and using, new home-based ICTs. It also presented a series of interpretive graphics reflecting how teaching and learning occurred while these 5-year-old participants learned to use and used new home-based ICTs. It is through these understandings that readers are presented with a group of 5-year-olds' emerging learning and literacy experiences within the context of their own cultural milieus, and which readers are challenged to address broader educational questions about how teaching and learning can be maximized between and across young children's multiple learning contexts.

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## Appendix A

### Ethics Approval



**University  
of Victoria**

**Human Research Ethics Board**  
Office of Research Services  
Administrative Services Building  
PO Box 1700 STN CSC  
Victoria British Columbia V8W 2Y2 Canada  
Tel 250-472-4545, Fax 250-721-8960  
Email ethics@uvic.ca Web www.research.uvic.ca

### Modification of an Approved Protocol

<b>PRINCIPAL INVESTIGATOR:</b> Keith McPherson <b>UVic STATUS:</b> Doctoral Student <b>UVic DEPARTMENT:</b> EDCI <b>SUPERVISOR:</b> Dr. Deborah Begoray	<b>ETHICS PROTOCOL NUMBER:</b> 07-07-196b <b>ORIGINAL APPROVAL DATE:</b> 20-Jul-07 <b>MODIFIED ON:</b> 18-Oct-07 <b>APPROVAL EXPIRY DATE:</b> 19-Jul-10
<b>PROJECT TITLE:</b> Investigating Primary-aged Children's New Home Literacies  <b>RESEARCH TEAM MEMBERS:</b> None  <b>DECLARED PROJECT FUNDING:</b> None	
<b>CONDITIONS OF APPROVAL</b>	
<p>This Certificate of Approval is valid for the above term provided there is no change in the protocol.</p> <p><b>Modifications</b> To make any changes to the approved research procedures in your study, please submit a "Request for Modification" form. You must receive ethics approval before proceeding with your modified protocol.</p> <p><b>Renewals</b> Your ethics approval must be current for the period during which you are recruiting participants or collecting data. To renew your protocol, please submit a "Request for Renewal" form before the expiry date on your certificate. You will be sent an emailed reminder prompting you to renew your protocol about six weeks before your expiry date.</p> <p><b>Project Closures</b> When you have completed all data collection activities and will have no further contact with participants, please notify the Human Research Ethics Board by submitting a "Notice of Project Completion" form.</p>	
<h3>Certification</h3>	
<p>This certifies that the UVic Human Research Ethics Board has examined this research protocol and concluded that, in all respects, the proposed research meets the appropriate standards of ethics as outlined by the University of Victoria Research Regulations Involving Human Participants.</p>	
<hr style="width: 30%; margin: 0 auto;"/> <p>Dr. Rachael Scarth Acting Associate Vice-President, Research</p>	

07-07-196b McPherson, Keith

## Appendix B

## Recruitment Letter

To: Mr. and Mrs. [family surname] and Family

Subject: Participants required for new home literacies study

From: Keith McPherson, Doctoral Research Student, University of Victoria



University  
of Victoria

## New Home Literacy Research Volunteers Required

“Its like our children speak a different language when they’re using their computers and electronic gizmos”.

“I remember the old days when you were limited to what you could look up in an [paper] encyclopedia. Boy, things have changed”.

“My daughter just told me that email is for old people”!

Are you like myself, and these parents above, and wonder how new technologies like the Internet are impacting the daily life of you and your children? Are you interested in exploring the ways you and your child interact with new media? Are you curious how these technologies may be fundamentally changing the way you and your child approach problems and communicate with each other?

If you are a parent of a 5 year-old child and answered ‘yes’ to any of these questions, you may wish to take part in a University of Victoria study researching the development of ‘new literacies’ of children. More information on the study can be found on the web at <http://www.lerc.educ.ubc.ca/newlit/>. If you would like to know more about this study, and/or are interested in taking part in this study, please phone 604-506-8754.

Sincerely,

Mr. Keith McPherson  
University of Victoria  
email: keithr@uvic.ca  
(604) 506-8754

## Appendix C

Research Overview, Posted Online

University  
of Victoria**Investigating Primary-Aged Children's New Home  
Literacies: Research Overview****Children's new home literacies**

Two years ago I was driving my two children home from school when my six year old asked, "Dad, may I have a MSN account"? Instantly I thought of chat room predators and became defensive. Looking in my rear-view mirror, I replied, "Why would you need an MSN account when you already have Yahoo email"? With an exasperated cluck of her tongue she responded, "Oh dad, you can't *hear* or *see* your friends with email. Anyways, email is for old people".

I drove the rest of the way home quietly reflecting on her claim that email was for "old people".

This brief verbal exchange with my daughter illustrates how becoming literate in these 'new times' can be seen as far more complex a task than just learning to read and write printed text (New London Group, 1996).

Prensky (2001) suggests that because children today are learning to be literate using a much different and diverse set of communication technologies than their parents, (e.g., the Internet, video camcorders, photo cameras, cell phones, MP3 players, and so on), these children are also developing much different and more diverse sets of communication strategies. This would explain why I'm comfortable using an 'old technology' like text-based email to read and write my communications, whereas my daughter is comfortable using a 'new technology' like MSN Messenger to read, write, *see and hear* much of her communications.

**Who is teaching these new literacies?**

According to research from the Canadian Media Awareness Network group (2005) my daughter is not alone in her uptake of these new communication technologies.

Ninety-four percent of young people say they go online from home. Sixty-one percent report having high-speed access. Thirty-seven percent have their own Internet-connected computer. Twenty percent of grade 4 students access the Internet through their own personal computer. Twenty-three percent of students report having their own cell phone, 44 percent of which have Internet capability. Fifty-six percent of students' cell phones have text messaging and 17 percent have cameras. Twenty-two percent of students have their own Webcam.

These statistics, however, do not explain how and where children are learning to use these technologies, and who is teaching them. Early research indicates that many children may be learning to use these new technologies mainly at home (Oblinger, 2006), and that they – not their parents or teachers - are largely responsible for teaching each other how to use these technologies (Livingstone, 2003; Prensky, 2001), and/or independently through games and trial-and-error software (Gee, 2006).

Prensky (2001) would argue that the reason parents and teachers are noticeably absent in children's development of new literacies because they don't 'speak' the same language as their children. Leu (2006, p. 5-6) argues that because the vast majority of literacy educators are mandated to follow curriculum and assessment policies that overemphasize the development of foundational reading and writing skills, little or no time is left to develop children's 'new' literacies.

Current language and literacy theorists (Street, 2003; Gee, 2003; Kress, 2003) argue that educators must not only acknowledge the different technological, social, and global realities presently shaping children's paths to literacy, but they must take an active role in helping students become critical and powerful users of as many out-of-school, real-world communication technologies as possible.

Papert (1998) suggests that until teaching pedagogy undergoes tremendous reform, literacy teaching will continue to remain grounded in traditional reading-writing literacy models and will exclude new literacies from the classroom. Dickson and Tabors (2001) further argue that instead of providing opportunities to develop linguistic equality in the classroom, schools actually exacerbate the literacy gap for socio-economically marginalized students. Gee (2003) argues further that when educators devalue students' out-of-school (or 'real world') literacies they create learning environments that students feel that are 'out of touch', 'boring', irrelevant, and unable to prepare students for the workplace. Luke (2003) warns that, left unchecked, these literacy gaps will widen the socioeconomic gap between the rich and poor and essentially become key barriers to a developed country's social and economic success.

When our children's rapid uptake of such communication technologies is contrasted against the warnings mentioned above, there is cause for grave concern. For literacy educators, this concern is heightened when one reflects upon the possible manners in which some of these communication technologies, like the Internet, can profoundly manipulate young children's consumer habits and literacy practices in unimaginable ways (Cho & Cheon, 2005; Semali, 2002).

Moreover, Karchmer, Mallette, Kara-Soteriou, and Leu (2005) note that literacy researchers continue to overlook the changes in student's real-world literacy landscapes. They warn that they do so at "great cost to our world and to our children" (p. 6). Furthermore in my review of the literature exploring the impact and changes that these new technologies are having on our children's literacy development, I found a growing body of material focused on middle school and secondary students, but very little was written on primary-aged students. Considering the emphasis parents and educators place on developing early and emergent literacy curriculum and programs, it is very startling to find we know so little about the role these new technologies play on young children's literacy development.

## **Research Purpose**

It is the intent of this research to begin documenting and understanding these seemingly very different new literacy practices for some of our society's youngest literacy learners. Because much of these new literacies are learned in the home, the general question that drives this research will be, "How are these new literacies learned and taught at home during a child's primary-aged years"?

Answers to this question are important to consider because they can assist parents and literacy educators understand complex changes occurring in literacy today. More importantly, findings from this research into the social practices and instructional principles associated with the learning and teaching of new literacies in primary-aged children's home settings has the potential to assist in the development of literacy teaching practices that can help parents and teachers successfully prepare children for current and future forms of communication (reading, writing, speaking, representing, listening, and visualizing).

With this in mind, the specific purpose of this research is twofold. First, to generate descriptive data representative of the types, patterns, and principles of new and multiple literacy learning (and teaching) practices between six to nine year-old children and their families when using information communication technologies (e.g., the Internet, cell phones, DVD recorders, video conferencing equipment) in their homes. Second, to develop a contextually sensitive critical literacy instructional model (Lankshear, 1997) based on practical pedagogy and aimed at understanding, valuing, and developing primary children's new and multiple literacies.

## **Benefits**

While the following benefits can not be assured, participants will likely develop a keen awareness of the variety and complexity of new/multiple literacy learning and teaching skills that they and their children engage when using new technologies at home. Furthermore, family members may become more aware of the potential impact these interactions may or may not have on their own and their young child's literacy development.

The children and youths in this study will likely benefit from this study as the findings may further validate and bring credibility to the new and multiple literacies they are consciously or unconsciously learning and/or being taught at home (and may or may not be supported outside the home). Findings will also likely encourage the children and youth of this study to become aware of their literacy learning styles and preferences, and may encourage them to further develop these 'new' preferences at home (e.g., their parents and/or their online teacher(s) may help the child develop these new and multiple literacies even further).

Findings from this study may also assist literacy educators to further understand complex changes occurring in literacy today. More importantly, findings from research that investigates the social practices and instructional principles associated with the learning and teaching of new literacies in primary-aged children's home settings has the

potential to assist in the development of literacy pedagogy that can successfully prepare children for current and future forms of communication (reading, writing, speaking, representing, listening, and visualizing).

Canadian educators will likely benefit from this study in that it offers the unique opportunity to develop a working instructional model that would assist Canadian educators in infusing school curriculum with meaningful multiple literacy instruction.

Several fields of literacy theory and research could benefit from this investigation into primary-children's in-home new and multiple literacies. Most notably, this study may provide information that will corroborate and/or refute: 1. Ethnographic research that has descriptively catalogued, and is still cataloguing, the myriad number of out-of-school paths, principles, and practices children employ when becoming literate (e.g., Heath, 1983), 2. Activity Theory research that explores the social dynamics of children's literacy acquisition (e.g., Scribner, 1981), and 3. New and Multiple Literacy Theory that is currently developing practical approaches to new literacy instruction (New London Group, 1996).

### **Participant Selection**

The participants for this study will include six primary aged children (ages six to nine year olds) and a maximum of three family members. Primary-aged children have been chosen because very little literacy research has explored the new literacies of this age group. Family members have been included in the sample because this study seeks to investigate the influence of social interactions of the child's acquisition of these new literacies in the home setting.

Participants are not selected solely by age. Children must also have attended an elementary school for one year in British Columbia, Canada, and have access and exposure to new communication technologies in their homes. The one year requirement has been included in order to maximize verbal communication between the researcher and participants.

Selection of families is limited to those that contain one to three family members. Less than one family member will not provide the social and cultural contexts that this study seeks to investigate. No more than three family members (not including the primary-aged child) will be included in the study as such large numbers can make for some unwieldy data collection and transcription.

### **Data Collection Procedures**

This 15-week study is divided into two phases (see Figure 1). The first phase is 3 weeks long during which participants meet the principal investigator for two, 1 hour sessions. In the course of these sessions, the principal investigator familiarizes participants with the video equipment, the study's procedures, and answers their questions about the study.

The second phase, the Data Collection Phase, occurs over 12 weeks. During this phase data is collected in three-week cycles. That is, participants are asked to collect video for 2 weeks, and then meet with the principal investigator in the third week with to discuss

the collected video. Then the participants collect 2 more weeks of video and meet with the principal investigator the third week, and so on. Participants are asked to execute four of these three-week data collection cycles

Participants are requested to collect video in their home that captures interactions between their child and themselves and/or other family members using (or learning to use) new communication technologies (e.g., Internet, MP3 player, cell phone, video camera, digital camera, online chat, and so on).

The principal investigator will visit the participants at the end of each video recording week so as to collect and review the video prior to the meetings. During the meetings, the participants meet with the principal investigator to: 1. view and discuss literacy events contained in video clips selected by the principal investigator, and 2. answer up to 10 open-ended interview questions posed by the principal investigator. These discussions and interviews will be audio taped.

### **Time commitments**

Participants are requested to spend a minimum of 1 to 2 hours of their time every week engaged with this study. This amounts to 15 hours over the 15-week period. This breaks down into 3 hours for orientation and training, 8 hours for video recording, and 4 hours for family discussions. The 15 week period in which participants will be volunteering their time extends from October 22, 2007 until February 22, 2008 (with a break from Dec 17, 2007 – Jan 4, 2008).

At first glance, it may seem that the time commitment required of participants is excessive. However, it is important to note that eight of the study's 15 hours is set aside for participants to independently video record their own and/or their family's natural social interactions while using new communication technologies. These 8 hours should often involve you and-or your child turning on and off the video recorder to record activities that are naturally occurring in the home (e.g., children's homework and game playing on the Internet).

### **Ethical Considerations**

There will be no prior relationship between any of this study's investigators and participants. Nor will I or my one research assistant have any 'power over' you, your child, or any one participating in this study. The risks to participants in this study are minimal. Participants will not be materially or financially compensated for their contributions to the study.

There are no known or anticipated risks to participants in this research. However, participation in this 15-week study may cause a slight inconvenience to some participants as they try to record a minimum of 2 hours of video a week, and schedule a 1 hour meeting between themselves and the principal investigator every third week.

Phase:	Phase 1: Orientation			Phase 2: Data Collection											
Cycle:	First Contact	Equipment Testing		1 <sup>st</sup> Cycle			2 <sup>nd</sup> Cycle			3 <sup>rd</sup> Cycle			4 <sup>th</sup> Cycle		
Week:	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15
Dates:	Oct 22-28, 2007	Oct 29 -Nov 4 2007	Nov 5-11 2007	Nov 26 -Dec 2 2007	Dec 3-9 2007	Dec 10-16 2007	Jan 14-20 2008	Jan 21-27 2008	Jan 28 -Feb 3 2008	Feb 4-10 2008	Feb 11-15 2008	Feb 18-22 2008	Feb 25-29 2008	Mar 3-7 2008	March 10-14 2008
Activity:	Researcher introduces subjects to data collection methods. Subjects test video equipment			Subjects video record examples of their own interactions using new ICTs	Whole family interview	Subjects video record examples of their own interactions using new ICTs	Interview with 5-year-old	Subjects video record examples of their own interactions using new ICTs	Interview with parent /s	Subjects video record examples of their own interactions using new ICTs	Final whole family interview				
Hrs/wk required of subjects:	2 - 4			2 - 4	1 - 2	2 - 4	1 - 2	2 - 4	1 - 2	2 - 4	1 - 2	2 - 4	1 - 2		

Figure 1. Research Schedule (October 22, 2010 – March 14, 2008)

## **Confidentiality**

The principal investigator will maintain all participants' privacy during the collection, assessment and dissemination of video, audio and photographic information by ensuring:

1. All data is identified using pseudonym labels,
2. Any audio and visual data revealing any participant's names or physical locations is erased, digitally diffused (made unclear), and/or voiced over with silence or pseudonyms,
3. Only the principal investigator and his research advisor will have access to and control of the data, including the transcriptions,
4. Participants are given the right to view, review, and listen to all video and audio data, and to request the principal investigator to digitally diffuse, delete and/or destroy (e.g., burn) any video and/or audio they feel is unsuitable for non-family members to view and/or hear,
5. Participants are given the option to restrict segments of video, audio, and selections of photographs from presentations, but allow the researcher to include the transcriptions of the video and/or audio in the data analysis.
6. The principal investigator will never release data to the popular media, and will present data only at scholarly educational presentations and in scholarly publications (e.g., home schooling and literacy conferences),
7. Data from anyone who has not signed a consent form will be deleted and/or destroyed, and
8. All data from this study will be incinerated five years after the completion of data collection.

It is important to note that even though the principal investigator has taken the steps above to maintain the participant's privacy, participant confidentiality cannot be completely protected because photos and segments of recorded video and audio data may visually identify the consenting participants.

Finally, the principal investigator will verbally remind you at each meeting, scheduled every third week, of your rights in this research and he will request your verbal free and ongoing consent for your continued participation.

## **Free and Informed Consent**

Participation in this study is entirely voluntary. Participants may refuse to participate or withdraw from the study at any time without any consequences or explanations. If a participant withdraws from the study but gives the principal investigator written permission to use partial data, then this data will be included in the study. If a participant withdraws and does not give written permission, all their data will be incinerated.

Adult and adolescent participants (participants who are 18-years of age or older) will use the Participant Consent Form to provide written consent through their signature and the date this signature was freely given. This signature and date represents the adult or adolescent participant's acknowledgement that they understand the study's conditions of

participation as outlined on the Participant Consent Form, and that they have had the opportunity to have their questions answered by the principal investigator.

Participating children and youths (participants under 18-years of age), and participants who cannot access the language on the consent form, must have the participating adult and/or adolescents read and/or explain the Participant Consent Form to them. Reading and/or verbally explaining these documents to children, non-readers, or low level readers is especially important as these participants may only be able to access the information through their parents and/or older family members. Parents must sign their name, their young participant's name, and the date, on the second line of the consent form as indication that they have verbally explained the research to the under 18-year-old participant and that they, the parent(s), are consenting on their behalf.

Every participant must read, sign and date one Participant Consent Form.

### **More Information?**

This study is being conducted as partial requirements for Mr. Keith McPherson's doctoral program at the University of Victoria. If you have any further questions or want further information about this study, please contact the principal investigator, Mr. Keith McPherson by phone at 604-506-8754 or by email at keithr@uvic.ca. Similarly, you may contact Mr. McPherson's doctoral supervisor Dr. Deborah Begoray, Professor of Education, University of Victoria by phone at (250) 721-7847 or by email at dbegoray@uvic.ca. Additionally, if you wish to verify the ethical approval of this study or raise any concerns that you might have about your or your child's treatments or rights as a research subject, you may contact the Associate Vice-President of Research at the University of Victoria at 250-472-4545.

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## Appendix D

## Telephone Screening Interview



Faculty of Education,  
Department of Curriculum & Instruction  
University of Victoria  
P.O. Box 3010, Victoria BC  
V8W 3N4

**Investigating Primary-aged  
Children's  
New Home Literacies:**

*(The following is read by principal investigator to potential participants)*

Good day. My name is Keith McPherson and I am the primary investigator for the University of Victoria research study titled "Investigating primary-aged children's new home literacy practices". I thank you for your phone message indicating your interest to participate in the study. Is this a good time for us to talk about the study?

*[If Yes: continue reading below. If no, PI arranges more convenient time to call]*

I will need about 10 minutes of your time to ask you a few questions, pass along some information about the study to you, and answer any of your questions. I estimate it will take us between 10 to 15 minutes? Are you able take this time at the moment?

*[If Yes: continue reading below. If no, PI arranges more convenient time to call]*

This study explores the new home literacy practices of 5-year-old children and their families. Your answers to the following eight questions will help me determine if you and your child fit the subject selection criteria for this study.

1. Are you the legal parent (e.g., biological, adopted, step) or symbolic parent (e.g., foster parent, aunt, uncle), of one or more five year-old children?

*[YES: go to #2] [NO: go to #6a]*

2. Before today, have you ever worked with, or associated with, this study's primary investigator, Keith McPherson?

*[YES: go to #5] [NO: go to #6b]*

3. Including the five year-old child, the maximum number of family members that can participate in this study is four. How many family members would be participating in this study? May I ask you or the ages of all the potential participants (including your own)?

*[If 4 or less participants, go to #6] [If five or more participants, go to #6c]*

4. This study requires that the participants commit a minimum of 2 hours a week of their time, over a 15-week period starting September 3, 2007, and ending March 17, 2008. Are you and your family able to commit a minimum of 2 hours of your time a week to this study, for 15 weeks? (Note: The bulk of your and your family's time will be spent at home doing 2 things: 1. video recording yourself and your primary-aged child, and/or your family and your primary-aged child, using new communication technologies such as the Internet, cell phones, digital cameras, MP3 Players, and so on, and 2. meeting for four 1 hour sessions with the principal investigator to discuss these videos).

*[YES: go to #7] [NO: go to #6d]*

5. Do you and or any of your family members use new communication technologies – for example the Internet, video, cell phones, MP3 Players, CDs, DVDs, video chat, and so on - with your child?

*[YES: go to #9] [NO: go to #6e]*

6. Unfortunately, your answer to this question indicates that one of the criteria for participant selection has not been met. More specifically, the study requires that *[choose one of the following]*:

- a) one of your children must be 5 years of age. Unfortunately your children do not meet this age requirement...
- b) you must have no previous personal or professional relationship with the primary investigator as this may effect data collection. Unfortunately you have known the primary investigator as a [state relationship] ...
- d) there be no more than four participants (includes the five year-old child) per family. Unless [state number] participants agree *not* to participate, then you have more than four participants wishing to participate, making for unwieldy data collection transcription and analysis...
- e) you and your child be using new communication technologies in the home. As you stated, you and your child are *not* using new technologies in the home

...therefore I must decline your and your family's kind offer to participate in this research. I thank you for your interest in this study, and look forward to the possibility of collaborating with you in future studies.

7. Congratulations! You and your family meet all the study's participant selection criteria. Before we continue, may I answer any questions raised for you during our phone conversation so far?

*[Primary investigator answers participant's questions].*

Were you able to read the research overview online, and did this information raise any further questions that I can answer for you?

*[Primary investigator answers participant's questions].*

If you still wish to participate in this study, may I, 1) confirm your phone number and email address, and 2) may I ask for your address so I can mail you an information package about the study?

*[Yes: researcher gathers requested information then continues with conversation below starting with "Tomorrow I will mail..."] [No: Primary investigator states, "I thank you for your interest in this study, and look forward to the possibility of collaborating with you in future home schooling studies"].*

Tomorrow I will courier or personally deliver this study's information package to you. It will arrive at your home by the first or second week of October - at the latest. Please phone me if it does not. My phone number is (604) 506-8754.

This package contains three printed documents. The first is a cover letter that gives you my contact information, explains the consent process, and lists instructions you need to complete before we meet the third week in October. ***It is important to read this letter and follow the enclosed instructions before our first face-to-face meeting.*** Doing so will save us a great deal of time at our first meeting.

The first document is titled the *Research Overview*. It explains the research process in more depth, and outlines your roles and rights as participants in this research.

The second document is titled the *Participant Consent Form*. This document explains the steps that have been taken to maintain your and your family's confidentiality. It also requests your signature as indication that you have had the study explained to you and that you agree to participate in the study under the conditions presented. Do not sign this until our first face-to-face meeting.

Each family member participating in this study must sign a separate *Research Consent Form*. Children under 18 years of age must have their parent sign their forms. How many family members will be participating in this study? [*Principal investigator records this number*]. Thank you. I will be mailing you \_\_\_\_\_ *Participant Consent Forms*.

Upon receiving these documents, and prior to our first meeting, please ensure that you, and all participants 18-years of age and older, read these documents and follow the instructions contained in the cover letter. They will answer many of your questions prior to our first meeting.

Unless you have any other questions about these documents or the study in general, I believe all that is left to do is schedule our first meeting in the first week of September. Are there any questions that I can answer?

*[Principal Investigator answers participant's questions, schedules first meeting in September, and ends the phone call thanking caller for their participation].*

## Appendix E

## Cover Letter



University  
of Victoria

Faculty of Education,  
Department of Curriculum & Instruction  
University of Victoria  
P.O. Box 3010, Victoria BC  
V8W 3N4

**Investigating Primary-aged  
Children's  
New Home Literacies:**

---

Dear [*name of participant/s*]:

Thank you for volunteering to participate in this study. The information that you, your family, and your child will generate during this study will, I hope, assist parents and literacy educators like yourself begin to understand the influence new communication technologies have on us and our children. Ultimately, I believe, the data you generate will help all educators develop new and powerful teaching and learning methods aimed at successfully preparing young children for current and future forms of communication (reading, writing, speaking, representing, listening, and visualizing).

Enclosures

You will find two types of documents enclosed. The first is a set of *Participant Consent Forms* printed on blue paper. The second is a document titled *Research Overview* printed on yellow paper. Please ensure everyone who will be participating in this study carefully reads these documents, or has them read and/or verbally explained to them, before we meet as a group on [*day/month/year of meeting to be entered*]. Reading and/or verbally explaining these documents to children, non-readers, or low level readers is especially important as these participants may only be able to access the information through you, their parents, and/or older family members.

Procedures

As outlined in Figure 1, this research commences October 22, 2007, is scheduled to take 15 weeks to complete, and ends March 14, 2008. This time is divided into two smaller "phases". The first phase, the Orientation Phase, takes place over the first 3 weeks. During this time, I will meet with you twice. Once to explain the study and obtain your written consent (blue documents enclosed), and once to drop off the video equipment and train all participants in its use. You are also asked to use this time to practice using the video equipment.

The second phase, the Data Collection Phase, occurs over the following 12 weeks. During this phase, data is collected in three-week cycles. That is, you are asked to collect video for 2 weeks, and then meet with the principal investigator the third week to

discuss the collected video. This three-week data collection cycle is repeated a total of four times (see Figure 1).

During the video collection weeks, you are requested to record a minimum of 2 hours (maximum 4 hours) of video per week. In most cases, this task just requires you to turn the camcorder on when you or another family member naturally starts an activity with your child that involves the use of a new communication technology (e.g., Internet, MP3 player, cell phone, video camera, digital camera, online chat, and so on). Then on the weeks you generate video, I will come by at week's-end and collect your recordings.

Every third week we will meet for 1 to 2 hours a week at your home, or a comfortable place of your choosing. During this time we will review and discuss segments of video selected from the previous weeks' recordings. I will also ask all participants five to 10 open-ended interview questions related to the video segments.

### Consent Form

Every family member consenting to participate in this study must read, sign and date one of the enclosed blue Participant Consent Forms. Children and youth less than 18-years-of-age must have their parents read and/or explain the form to them and have their parents sign and date the form on their behalf. Since the consent process requests participants sign the consent form only *after* they have had their questions about the study answered by the principal investigator, *and* they fully understand the conditions for participation as outlined on the Participant Consent Form, I ask you and your family to refrain from signing the consent form until our first meeting.

### Meetings

Hopefully we have already booked a time for our first one or two orientation meetings. If not, please phone me at the number below as soon as possible. Also, I would request that prior to our first meeting you check your schedules and identify the most convenient times that I can pick up your weekly video recordings, and the best times to book our family discussions (recall these discussions occur every third week over the final 12 weeks). Scheduling well in advance will help us plan our busy schedules around these meetings.

Please do not hesitate to contact me at the phone number below if you have any questions. I look forward to working with you over the next few months, and exploring your and your child's use of new home communication technologies.

Sincerely,

Keith McPherson

Principal Investigator  
'Investigating Primary-aged Children's New Home Literacies'  
University of Victoria  
Phone: (604) 506-8754, Email: keithr@uvic.ca

Phase:	Phase 1: Orientation			Phase 2: Data Collection											
Cycle:	First Contact	Equipment Testing		1 <sup>st</sup> Cycle			2 <sup>nd</sup> Cycle			3 <sup>rd</sup> Cycle			4 <sup>th</sup> Cycle		
Week:	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15
Dates:	Oct 22-28, 2007	Oct 29 -Nov 4 2007	Nov 5-11 2007	Nov 26 -Dec 2 2007	Dec 3-9 2007	Dec 10-16 2007	Jan 14-20 2008	Jan 21-27 2008	Jan 28 -Feb 3 2008	Feb 4-10 2008	Feb 11-15 2008	Feb 18-22 2008	Feb 25-29 2008	Mar 3-7 2008	March 10-14 2008
Activity:	Researcher introduces subjects to data collection methods. Subjects test video equipment			Subjects video record examples of their own interactions using new ICTs	Whole family interview	Subjects video record examples of their own interactions using new ICTs	Interview with 5-year-old	Subjects video record examples of their own interactions using new ICTs	Interview with parent /s	Subjects video record examples of their own interactions using new ICTs	Final whole family interview				
Hrs/wk required of subjects:	2 - 4			2 - 4	1 - 2	2 - 4	1 - 2	2 - 4	1 - 2	2 - 4	1 - 2	2 - 4	1-2		

Figure 1. Research Schedule (October 22, 2010 – March 14, 2008)

## Appendix F

## Participant Consent Form



University  
of Victoria

Faculty of Education,  
Department of Curriculum & Instruction  
University of Victoria  
P.O. Box 3010, Victoria BC  
V8W 3N4

**Investigating Primary-aged  
Children's New Home  
Literacies:**

**Participant Consent Form**

You are being invited to participate in a research study entitled *Investigating Primary-aged Children's New Home Literacies*.

This research is being conducted as part of my doctoral degree requirements in the Department of Curriculum and Instruction, University of Victoria, and is funded by the Social Sciences and Humanities Research Council of Canada. The study's principle investigator is myself, Mr. Keith McPherson. I can be contacted by phone at 604-506-8754 or by email at keithr@uvic.ca. This study is being conducted under the supervision of Dr. Deborah Begoray, Professor of Education, University of Victoria. Dr. Begoray can be contacted at (250) 721-7847 or by email at dbegoray@uvic.ca.

Literacy researchers know that the majority of Canadian children today are very quickly learning to use many different new communication technologies (e.g., the Internet, digital cameras, cell phones, MP3 players, and Microsoft chat), and that these technologies are being learned outside formal school time.

What isn't known about the quick uptake of these new out-of-school communication technologies is: "Who is doing the teaching"? "How are these young children (6-9 year-olds) being taught and/or learning to use these new technologies"?, and "What new or familiar powerful principles of literacy learning and teaching are exhibited when children are learning to use these new technologies"?

The purpose of this study is to generate data that begins to answer these questions, and that will assist in developing a practical teaching model that can be used to strengthen literacy education in home and educational settings.

You are being asked to participate in this study because you may be the parent of one or more primary-aged (6 to 9 year-old) students who are learning to use these new communication technologies at home. I have either come into contact you through the support group distribution email list for the British Columbia Home School Association, or through out-of-school interactions between our children.

If you agree to voluntarily participate in this research, your participation will require between 1 to 2 hours per week of your time, for a period of 15-weeks. In weeks 1, 2,

and 3 the principal investigator will meet with you for two to 3 hours to explain the study in depth and train you to use the video equipment. In weeks 4, 5, 7, 8, 10, 11, 13, and 14 you will be asked to spend 2 hours a week (minimum) recording examples of you and/or your family using new communication technologies with your child. In weeks 6, 9, 12, and 15, you will be asked meet with me, the principal investigator, for 1 hour a week (minimum) to discuss and review the previous 2 weeks of video recording. The maximum number of hours spent participating in this research will depend on how many hours a week you choose to go beyond the minimum requirements for recording and reviewing video.

There are no known conflicts of interest or anticipated risks to you, your child, or any of your family members by participating in this research.

While the potential benefits of your participation in this research can not be assured, you will be offered a summary of the study's findings which will likely provide you insights into the variety and complexity of new literacy learning and teaching principles that you, your primary-aged child, and your family (and other families) engage with when using new communication technologies in the home.

Canadian educators and parents will likely benefit from this study in that it attempts to provide a working model for weaving new communication technologies into young children's literacy instruction.

There will be no payment of compensation for your participation in this study. Your participation must be completely voluntary. If you do decide to participate, you may decline to answer any interview questions and you may withdraw at any time without any negative consequences or any explanation. If you do withdraw from the study but give me written permission to use your partial data, then this data will be included in the study. If you withdraw and do not give written permission, I will incinerate all your data.

To make sure of your continued consent to participate in this research, I will verbally remind you every third week of your rights in this research and will request your verbal free and ongoing consent for your continued participation.

I will endeavour to maintain a high degree of confidentiality during the collection, assessment and dissemination of video, audio and photographic information by ensuring: 1. All data is identified using pseudonym labels, 2. Any audio and visual data revealing any participant's names or physical locations is erased, digitally diffused (made unclear), and/or voiced over with silence or pseudonyms, 3. Only my research supervisor, my two research assistants, and myself will have access to and control of the data, including the transcriptions, 4. You are given the right to view, review, and listen to all video and audio data, and to request that I digitally diffuse, delete and/or destroy (e.g., burn) any video and/or audio that you feel is unsuitable for non-family members to view and/or hear, 5. You are given the option to restrict segments of video, audio, and selections of photographs from presentations, but allow me to include the transcriptions of the video and/or audio in the data analysis, 6. I will never release data to the popular media or allow data to be used for commercial purposes, 7. I will present

data only at scholarly educational presentations and in scholarly publications (e.g., home schooling and literacy conferences and journals), 8. Data from anyone who has not signed a consent form will be deleted and/or destroyed, and 9. All data from this study will be incinerated five years after the completion of data collection.

However, it is important to note that even though I have taken these steps to maintain your privacy, your anonymity and confidentiality cannot be completely protected because photos, video and audio data may visually identify you and all consenting participants. *By signing and dating this consent form you are consenting to allow yourself, or your child, to be photographed, video recorded, and audio recorded, and to allow myself to use the resulting audio-visual data under the conditions outlined on this consent form.*

The use of multimedia data like video, photos, and audio is central in the presentation of this study's findings in that it allows me to visually demonstrate to parents, educators, and scholars the use of new and multiple communication technologies for collecting and presenting powerful research evidence. More importantly, it allows me to visually and aurally demonstrate the learning and teaching practices that you and your child - the real 'voices' of this research – reveal when using new communication technologies in the home.

You may contact myself and/or my research supervisor at the phone numbers listed at the start of this document. Additionally, you may verify the ethical approval of this study, or raise any concerns you might have, by emailing ([ethics@uvic.ca](mailto:ethics@uvic.ca)) or phoning (250-472-4545) the University of Victoria's Human Research Ethics Office.

Your signature on the first line, below, indicates that you are 18-years of age or older, that you understand the above conditions of participation in this study, and that you have had the opportunity to have your questions answered by myself and/or my research supervisor. Your signature on the second line, below, indicates that you and/or I have verbally explained the research to any under 18-year-old participants named and that you are consenting on their behalf.

<i>Name of Participant Over 18-years of age</i>	<i>Signature of Participant Over 18-years of age</i>	<i>Date signed</i>
<i>Name of Participant Under 18-years of age</i>	<i>Signature of Legal Parent, Guardian or Symbolic Parent</i>	<i>Date signed</i>

*A copy of this consent will be left with you, and a copy will be taken by the principal investigator.*

## Appendix G

## First Cycle Interview Questions – Parents and Children



Faculty of Education,  
Department of Curriculum & Instruction  
University of Victoria  
P.O. Box 3010, Victoria BC  
V8W 3N4

**Investigating Primary-aged  
Children's  
New Home Literacies:**

1<sup>st</sup> Cycle Interview Questions

**Ethical Reminder to Participants:**

Your participation in this study is entirely voluntary. If at any time in interview you don't understand a question, please ask me to "repeat the question" or "rephrase the question". Furthermore, it is important to know that you, your child/ren, and any other participants do not have to answer any questions that you feel uncomfortable answering. If you do not wish to answer a question, please just say "pass" and I will immediately skip the question.

The following questions aim at getting you to talk about the communication technologies you and your child use in and around the home (e.g., the mall, the car, but not in school). There are no right or wrong answers to these questions, and although my wife and I allow our children to use new and old communication technologies in our home, I am balanced on my opinion of their merits and drawbacks. Please feel free to add any information to any of the questions at any time. Ready?

**1. Types of communication technologies owned and used in the home.**

- a) What types and how many units of the following types of communication technologies do you and/or other family members own and/or use in and around the home (e.g. 1 cell phone)?

I. Cell phone	V. Palm Pilot	IX. Digital Camera
II. Land Line Phone	VI. CD Player	X. TV
III. Computer	VII. DVD Player	XI. Others
IV. MP3 player	VIII. SLR Camera	

- b) Are there any other information communication technologies (ICTs) not mentioned on this list that you and/or other family members own and/or use in and around the home? *If yes:* Please list and describe these technologies.

## 2. Location of communication technologies.

- a) Where in the home (and/or outside the home) are these communication technologies located and used? (list next page...)

I. Cell phone	V. Palm Pilot	IX. Digital Camera
II. Land Line Phone	VI. CD Player	X. TV
III. Computer	VII. DVD Player	XI. Others
IV. MP3 player	VIII. SLR Camera	

## 3. Child's access to information communication technologies in the home.

- a) Which of these communication technologies is/are your child/ren able and allowed to independently access and/or use?
- b) Which ones is/are child/ren *not* allowed to independently access and/or use?
- c) Is their time with any of these communication technologies scheduled? *If yes:* When and how much time? Please explain why you feel it is important for you to schedule X amount of time for your child/ren to use these communication technologies? *If no,* Please explain why you feel it is *not* important for you schedule X amount of time for your child/ren to use these communication technologies?

## 4. Frequency of communication technologies used by children in the home.

- a) How many hours/minutes would you estimate your child/ren uses each of these communication technologies (as listed in questions 2a) during an *average* week over the past four months?

## 5. How are children are using these technologies?

- a) What is/are he/she/they using these new communication technologies for? Please list at least three activities for each of the following:

I. Cell phone	V. Palm Pilot	IX. Digital Camera
II. Land Line Phone	VI. CD Player	X. TV
III. Computer	VII. DVD Player	XI. Others
IV. MP3 player	VIII. SLR Camera	

## 6. Age to begin teaching?

- a) Your family was selected for this study because you allow your child/ren to use *new* technologies in the home environment. By “new communication technologies”, I mean all audio-visual communication technologies that have appeared in your home over the last 20 years (Like cell phones, computers, MP3 players, digital cameras, DVD players as opposed to TVs, analogue tape players, and VCRs). At what age did your child/ren begin to learn to use such new communication technologies?

- b) Reflecting back on the age when your child/ren began learning to use these new technologies, when do you think was/is the best time for him/her/they to begin to learn to use these new technologies?

**7. Who teaches the children to use communication technologies, how are they taught, and where are they taught?**

- a) Please list all the people, that you can think of, who has taught and/or teaches your child/ren to use these communication technologies (e.g., in/out of school).
- b) How/when does this teaching occur? Please give me three examples for each technology.
- c) Who seems the best person suited at teaching your child/ren to use these new communication technologies? Why are they the best? Please list at least three reasons or attributes why you believe this is so.
- d) Where do you believe is the best *place* for child/ren to learn to use new communication technologies? Please explain why do you believe this.

**8. Types of computer software/websites visited.**

- a) What, if any, are the favourite software/websites that your child/ren use?
- b) Do/Does any of this software/websites require an older persons supervision or assistance? If so, please tell me who assists and supervises the child/ren?
- c) Please explain to my why you feel your child's/children's use of this/these software/websites require your supervision?

**9. Internet access and online software.**

- a) For what reason, or reasons, was this service purchased? If there is more than one, reason, please rank them from most important to you and your family to least important to you and your family.
- b) Would you have purchased this service if you didn't need it for (reason/s explained above).
- c) What types of online software do you let your child/ren use?

**10. School's role in developing primary children's skills in using new ICTs.**

- a) Does the school teach your child/ren to use new communication technologies? *If yes:* Please give me two examples of work your child/ren has done (or that you have heard your child doing) involving the use of new ICTs.
- b) Should the school be teaching your primary aged children to use new communication technologies? *If yes:* 1. Please give me an example of three things children should be taught (with regards to new communication technologies) and when. 2) Why do you believe it is important that school teach these aspects of communication technologies. *If no:* 1. What do you believe schools should be concentrating on? 2. Why do you believe this?

## Appendix H

## Second Cycle Interview Questions – Children Only



Faculty of Education,  
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 University of Victoria  
 P.O. Box 3010, Victoria BC  
 V8W 3N4

**Investigating Primary-aged  
 Children's  
 New Home Literacies:**

**2<sup>nd</sup> Cycle Interview Questions**

To parents:

Reminder: Your and your family's participation in this study is entirely voluntary. At any time you and/or your child/ren can say "pass" to any questions that you feel are inappropriate. If you don't understand a question, or think the child doesn't understand the question, please feel free to ask me to "repeat the question" or "rephrase the question", or don't hesitate to rephrase the question in terms that you and/or they will understand.

Also, you, or any other participants in this study, are more than welcome to attend and join your son/daughter/children in our hour-long interview. However, because this segment of the study intends to generate data representative of your child's at-home literacy practices using new communication technologies, I would be grateful for your assistance in encouraging him/her/them to answer as many of the questions as possible on their own.

To child/ren:

*(Researcher reviews the intent of his research and current visit. He reminds child/ren that they are 'experts' when it comes to helping others understand how they and their parents use things – new communication technologies - like the TV, computer, cell phone, MP3 player, and so on, in and around their homes, and I am here to gather as much information about what they )*

Today, I would like to play 'show-and-tell' with you. Have you ever played show-and-tell before? Maybe in school? [*If yes: Can you tell me how you play show-and-tell?*] [*If no, or doubtful: Researcher briefly explains how to play.*]

The show and tell we're going to play today is a question-and-answer show and tell. In this game, I'll ask you a question, and then you can show-and-tell me your answer. For example, I may ask you: How do you turn on your computer? And you might answer by showing me *and* telling me how you turn on your computer. Most of my questions will be about how you and your parents are using electrical things around your home, like computers, cell phones, and DVD players. Then you get to show and tell me how you

use these things. Does this sound easy? Do you think you can do it? Do you have any questions so far?

Before we begin, I need you to understand three important things. First, in this game of show and tell, it is important that you know there are no wrong answers to any of the questions I ask you. All answers are correct. My questions are only meant to help you show-and-tell me what you know about how you and your parents use things like computers and cell phones. Second, if you don't understand a question, please ask me to say it again, or tell me to say it again using different words. And third, if you don't want to answer a question, just tell me to "skip it" or "pass it" and I'll go to the next question. OK? Does this make sense? Do you have any questions? Are you ready to go? OK, let's start...

### **1. Awareness of new communication technologies in working environment.**

- What do you want to be when you grow up?
- Why do you want to be a \_\_\_\_\_ [e.g., fire fighter, musician, and so on]?
- Have you ever seen a real \_\_\_\_\_ working? *If yes:* Please describe what you saw and heard. *If no:* Please describe what you might see or hear.
- When you become a \_\_\_\_\_, do you think you'll need to know how to use a computer [and/or other related communication technology]? Please tell me how you know this.
- When you're older and you become a \_\_\_\_\_ what might you use a computer for?

### **2. Favourite activities using the computer [and/or names of other technologies].**

- I watched this video of you using your computer with your parents, (and/or with friends, siblings, and so on) [Show child video]. Please tell me what you were doing and thinking here. And I watched this one using the computer by yourself [show video]. Can you tell me what are you doing in this video? You seem to enjoy using the computer [and/or names of other technologies]. Would you tell me (and/or show me) your favourite things to do by yourself on the computer [and/or names of other technologies]? Would you tell me (and/or show me) your favourite things to do with your family and friends on the computer [and/or names of other technologies]?
- What else do you use the computer [and/or names of other technologies] for?

### **3. The burdens and blessings of learning with new communication technologies.**

- When I looked at this video [show child video] of you using [name of technology/ies] it seemed that most of the time you were having fun. Why do you like using [name of technology/ies]?
- Is there a time when it isn't fun?
- Would you tell me what has happened to you to make using the computer no fun at all? An example?
- What are you afraid to do with [name of technology]?

**4. Children's perceptions of who is teaching them and how they are being taught/are learning to use these new technologies.**

- Who taught you to use the [name of technology/ies]?
- Does anyone else teach you how to use the [name of technology/ies]?
- How did they teach you? Please tell me more about how they taught you?

**5. Understanding the importance of reading and writing on the Internet.**

- As I watched you use the [name of communication technology/ies] in this video [show video], it seemed like you were reading what was on the screen. Can you read?
- Do you need to know how to read to use the computer? Please tell me why/why you think it is/isn't important to know how to read on the computer.
- How do you learn how to read what is on the screen? [Ask child to show you on the computer].
- Do you write? Do you need know how to write?
- What other things other than reading and writing must you know how to do, or learn to do, if you want to use the computer [and/or other technologies]?

**6. Child's approach to teaching others.**

- Looking at the video of you using the computer [or other technology/ies], you seem to be an expert at using the computer. If there was another child here today that had never used a computer before, could you tell me the best way they could learn how to use a computer?
- Often adults ask experts, like you, for help. What three things would an expert like you recommend adults do when learning how to use the computer?

**7. What computers are for...**

- One simple question. Just what are computers [name/s of communication technologies] used for?

**8. Who helps when things go astray using computer...**

- If something goes wrong when you are using [name of communication technology], how do you get help? Who helps you? Could you describe how they have helped you before? What did they do to help you?

If time permits...

9. Do any of your friends or family have [name/s of communication technologies]? Do you ever talk or play with them using [name/s of communication technologies]? Please tell me where and when you talk to them/play with them? Do you talk about using the [name/s of communication technologies] with your friends/family?

10. My children, Jacob and Hannah, use the cell phone and email to talk to friends and family. Can you do this? Do you do this? Would you like to do this? Why would you like to do this? If you can, please give me three reasons why you would and visit your friends and grandparents instead of using a cell phone/phone/computer.
11. What is one of your favourite things to learn about? If you wanted to learn more about [name of favourite thing], where would you go for more information? Where else would you search?
12. This segment of video we just watched showed you and [name of participant] looking for information on the Internet (or CD and so on). Could you tell me more about how you find information.
13. I have two children. A five-year old son and a nine-year old daughter. When they aren't doing chores at home, going to music and sports lessons, camping, playing with friends, doing schoolwork, or doing other similar things, they have learned (and are learning) to use equipment at home like our DVD player, CD player, mp3 player, video camera, digital camera, computers and the Internet. What types of equipment do you have at home? Would you tell me more about how you use this equipment? What kinds of equipment do you wish you could learn to use next? Could you tell me more about why you want to learn to use this equipment?
14. I will name something and I want you to tell me if you know what this is, or if you have used it. Okay? Tell me, do you know what I mean when I say:
  - Computer
  - Internet
  - Video camera
  - Cell phone
  - Chat
  - MP3 Player
  - Palm Pilot
  - CD/DVD Player
  - Digital Camera
  - Laptop (and so on).

Please tell me when you use a [name of technology]? When do you use a \_\_\_\_?  
Do you need help using it? Who do you use it with? How do you use it?

Well you're very good at show-and-tell. You answered all my questions, and your answers were just what I needed. Thank you very much for sharing me your expertise and showing me how you use your computer, your games, and [how to take a picture on your cell phone, and so on].

## Appendix I

## Third Cycle Interview Questions – Parents Only



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 V8W 3N4

**Investigating Primary-aged  
 Children's  
 New Home Literacies:**

**3<sup>rd</sup> Cycle Interview Questions**

To parents:

Reminder: Your and your family's participation in this study is entirely voluntary. At any time you can just say "pass" to any questions that you feel you, or your child/ren, should not be answering. If you don't understand a question, or think the child doesn't understand the question, please ask me to "repeat the question" or "rephrase the question", or don't hesitate to rephrase it in terms that they will understand.

The following questions are geared toward understanding your concepts about and your patterns of uses of new technologies in the home...

1. Consider the terms, '**old communication technologies**' and '**new communication technologies**'. Please describe two examples of old communication technologies, and two examples of new communication technologies.
2. What are the defining characteristics unique to a new communication technology? (or, What is 'new' about 'new technologies?').
3. Please explain what you think is meant by the term **literacy**?
4. Please describe *at least three* characteristics and/or abilities of a person who has acquired **literacy**?
5. Please explain what you think is meant by the term **new literacy**?
6. Please describe *at least three* characteristics and/or abilities of a person who has acquired **new literacy**?
7. Please list *at least three* characteristics and/or abilities that are **similar** between a person who is acquiring *literacy* and a person who is acquiring *new literacy*. (If you find there are no similarities, please explain why you think this).

8. Please list *at least three* characteristics and/or abilities that are **different** between a person who is acquiring *literacy* and a person who is acquiring *new literacy*. (If you find there are no differences, please explain why you think this).
9. Consider:
- possible similarities and differences between the way you *learned* to become literate, and the way your child is *learning* to become literate. Please describe three examples of learning situations that highlight **distinct similarities** between your child's literacy development, and your memories of your own elementary literacy development.
  - Please provide three examples of how you believe they are **distinctly different**. (If there are no differences and/or similarities, please explain why you believe this is so).
  - Now view this video clip of your child using a new communication technology, and see if you can think of any other similarities and differences between the way you were *learned* to be literate, and the way your child is learning to be literate.
10. Consider:
- possible similarities and differences between the way you were *taught* to be literate, and the way your child is being taught to be literate (by yourself or by others). Please describe three examples of situations that highlight **distinct similarities** between how your child is, and you were, taught to be literate.
  - Please provide three examples of how you believe they are **distinctly different**. (If there are no differences and/or similarities, please explain why you believe this is so).
11. According to Spender (1997), history shows that all new communication technologies come with a multitude of "blessings and burdens". He argues, that the printing press helped humans improve their communications (e.g. allowed the archiving of thought), while helping increase the socio-economic gap between the rich and the poor (e.g., white professional males used the printing press to amass wealth, prestige, and power, and marginalize indigenous people, women, and those with few resources).
- Now consider the new communication technologies your child currently uses. Please describe three or more **past or present** instances where you have observed new communication technologies "burden" your child's job of becoming literate. Please describe three or more **past or present** instances that illustrate how new communication technologies have made becoming literate easier (a blessing) for your child.
12. Please describe *three or more* possible situations in which new communication technologies may hinder (be a burden on) your child's literacy development in the

- future?** Please describe *three or more* examples of how these new communication technologies might assist (be a blessing to) your child's literacy development in the **future**?
13. Some educational researchers have observed that most humans are members of a wide variety of '**discourse circles**' that make use of different literacy technologies and require different literacies and language skills (Gee, 2003). For example, the language and literacy practices and literacy technologies that family members use in their home 'discourse circle' are often very different than those used at work. And both of these are much different than those used in a game of basketball. *Please list as many of your child's distinctly different 'discourse circles' in which they use new communication technologies.* For example, they may use a computer at home and at daycare. (If you are having difficulties with the term 'discourse circles', try to imagine the variety of *distinctly different* social situations and activities in which your child has engaged over the past 6 months. Each of these activities can be seen as a different discourse circle).
14. Have you ever observed your child using the same communication technology in more than one discourse circle or social situation? Please briefly describe one or two of these observations. Next, reflect upon the activity/ies that your child engaged with in each situation. Were the literacies your child learning different or similar? What did you observe that made you think this? Please explain.
15. Using the following scale to answer the following question:
- |                         |                           |
|-------------------------|---------------------------|
| 1 = essential,          | 4 = of little importance, |
| 2 = very important,     | 5 = of no importance      |
| 3 = somewhat important, |                           |
- Please explain why you believe it to be \_\_\_\_\_ that your child learns to use new communication technologies.
16. In 2006, Dr. Gee, professor of the University of Wisconsin at Madison, stated, "[Video] Games often do a better job at getting themselves learned than schools do in getting things like science learned". In what ways might new communication technologies "do a better job at getting themselves learned than schools do in getting things like science learned"? In what ways might they do a worse job?
17. Please consider the comment, "what happens in the real world is not congruent with the literacies taught in most schools". Considering your child's use of new communication technologies, in what ways do you agree and/or disagree with this statement?
18. Consider the statement, "We sense our surroundings not just through reading and writing". Please explain in what ways you feel new communication

- technologies allow your child to embrace this statement (if at all), and what ways they do not (if at all).
19. New communication technologies, like the Internet, cell phones, MSN chat, or [example of new technology used by family from video], have become more common as a means of communication for Canadian youth and families. As more people use these technologies there are benefits as well as problems. Please discuss what you believe are the ADVANTAGES and DISADVANTAGES of using new communication technologies with young children. Be sure to include at least two examples of advantages and two examples of disadvantages.
  20. Describe three ways that your learning and teaching with your child is different, and three ways it is similar, when using new communication technologies as compared with print-bound materials (like books, maps, atlases).
  21. Describe several suggestions you would make to parents thinking of teaching their primary-aged children to use new communication technologies. Rank these in order of most important to have in place to least important. Please explain your rank order.
  22. This and the following question investigate your and your child's out-of-school reading habits. How much time does your child spend reading (viewing/engaging with) printed books in the home over the course of an average week? Over an average week, how long do *you spend with your child* reading (or helping them read) printed books at home? Outside the school, where/when does your child choose to read printed books? When do you read these printed books with your child, and where? Who is responsible for reading these books to your child? In your opinion, why does your child choose to read printed books (that is, what do believe they get out of this activity)? If you have a goal for having your child read printed books, what might this be?
  23. How much time does your child spend reading (viewing/engaging with) computer text in the home over the course of an average week? Over an average week, how long do *you spend with your child* reading (or helping them read) computer text at home? Outside the school, where/when does your child choose to read computerized text? When helping your child read computerized text, when does this occur and where? Who is largely responsible for helping your child read computerized text? In your opinion, why does your child read (or try to read) computerized text (that is, what do you believe they get out of this activity)? If you have a goal for having your child read computerized text, what might this be?
  24. To summarize what you've told me, your child spends \_\_\_\_ hours reading books and \_\_\_\_ hours playing on the computer. How many of these hours reading books would you estimate is lap-time (e.g., snuggling on a couch or bed, and how many lap-time hours are spent on new technologies like the computer? Why do you believe this to be so?

## Appendix J

## Example of Fourth Cycle Questions – Parents and Children



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**Investigating Primary-aged  
Children's  
New Home Literacies:**

**4<sup>th</sup> Cycle Interview Questions**

To parents:

Reminder: Your and your family's participation in this study is entirely voluntary. At any time you can just say "pass" to any questions that you feel you, or your child/ren, should not be answering. If you don't understand a question, or think the child doesn't understand the question, please ask me to "repeat the question" or "rephrase the question", or don't hesitate to rephrase it in terms that they will understand.

Fourth Cycle Questions

1. Last week, Yahoo Canada posted an informal poll on its website regarding the use of computers in the primary grades in schools. The question asked was: Can computers in schools hurt early literacy education? Yes or no? What is your answer to this question and why?

Reveal the following Yahoo results after participants' response:

59 % say Yes, they distract from basic literacy skills  
41 % say No, computers are just like pen and paper

2. This question was based on a study by the Frontier Centre For Public Policy (reported by the Canadian press, via Yahoo Canada) which says:

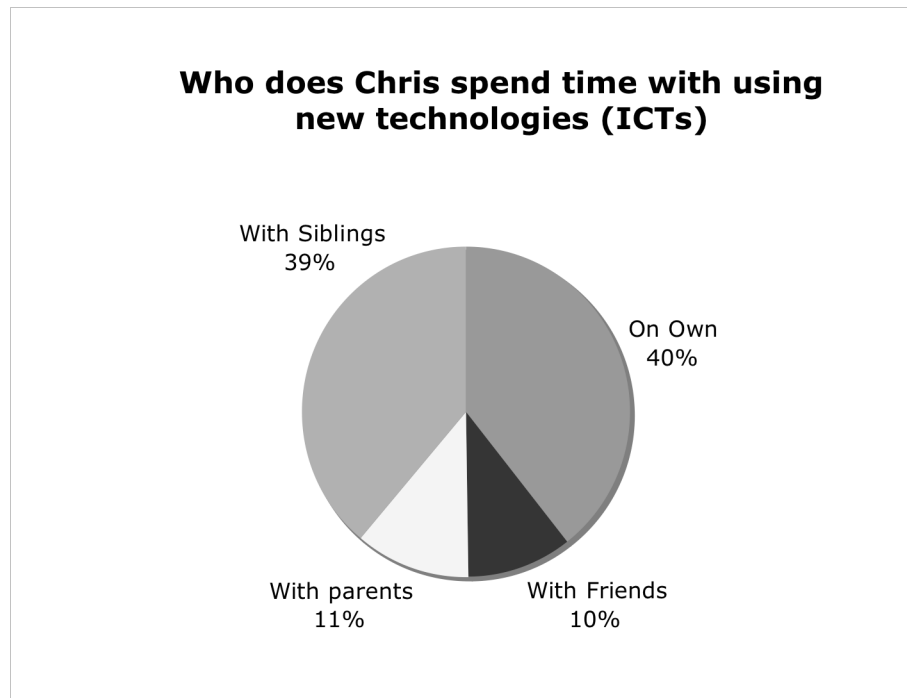
The growing use of computers in schools can be hazardous to the education of young children. Time spent in front of a computer could be better spent learning basic literacy skills and interacting with the teacher, says the four-page brief. Author stated: "I certainly don't think that at the earliest levels that having regular computer time every week, especially kindergarten to grade 4, is necessarily the best use of time." (see [http://ca.news.yahoo.com/s/capress/080225/national/computers\\_in\\_class](http://ca.news.yahoo.com/s/capress/080225/national/computers_in_class))

Media Awareness network finds: "Our research shows that kids are spending most of their time on the Internet getting information, using it as a communications tool and getting all their entertainment from it, (so) we need to address it in the classroom and

that would be difficult to do without computers," Cathy Wing, one of the network's executive directors, said from Ottawa.

"We certainly feel that we should be teaching those skills right from the time they go online."

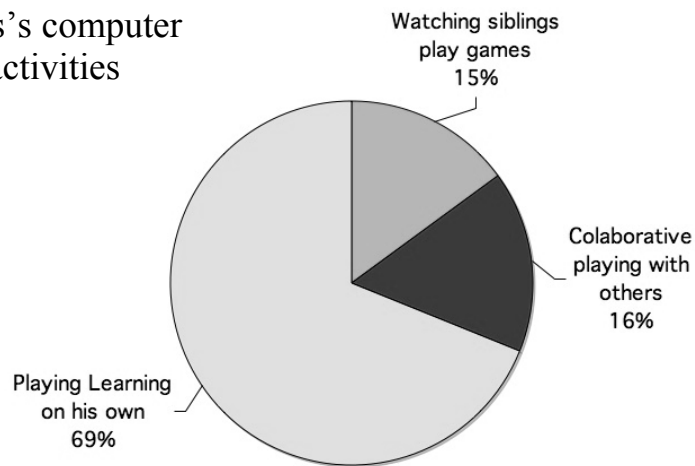
3. So far I have viewed the majority of your video recordings of Chris (and Liza) using the computer and found the following:



Would this be in your opinion a fairly accurate representation of the people that Chris spends with new communication technologies (not just computers) outside of school (e.g. home, daycare, and so on)? Would it be an accurate representation of the percentage that each group contributes to his literacy development in the area of new communication technologies?

4. In reviewing your video, I found that the majority of Chris's activities involve gaming, in particular Internet gaming. I have found that when using the computer, 69% of his activities revolve around playing games (online or on CD), 16% involves collaborating with others in playing Internet games, 15% spent watching others play computer games? Are there any games which he communicates or plays with people on the Internet? Would you say this graphic is accurate or does he do other activities with these communication technologies?

Chris's computer activities



5. At the start of this study I introduced you to a variety of new communication technologies that you have around the home such as

- |                       |                   |
|-----------------------|-------------------|
| XII. Cell phone       | XVI. Palm Pilot   |
| XIII. Land Line Phone | XVII. CD Player   |
| XIV. Computer         | XVIII. DVD Player |
| XV. MP3 Player        | XIX. Other        |

Reviewing your video I noted that the majority of time Chris spends with new communication technologies involves the computer. Would you say this is correct? Does he spend more time on the computer than watching TV (or videos)?

6. The Federally funded Media Awareness group surveyed the online computer surfing habits of 5,000 randomly selected grades 4 – 12 Canadian children. They found that “Almost all (94%) of students’ top 50 sites include marketing material [advertising]. They also state that need to be taught how to use it responsibly. And that we need to address it in the classroom ...[with]...computers”. They suggest that schools help student develop the necessary critical thinking skills to defend themselves from questionable online marketing and advertising. Is your school equipped with the necessary equipment and Internet access necessary to develop K-4 students critical thinking skills? Should schools be responsible for developing the K-4 students critical thinking skills, including Chris and Liza? Or, is this something parents should address? Is this something you have addressed with Chris, Liza or Carmen?
7. Have you ever entered in the room and tried talking to Chris and he doesn't seem to be listening? That is, he is so focused visually and aurally (and to a lesser extent kinaesthetically) on the screen that he can't hear you? (If yes...) Can you describe this instance? Researchers like Heath say that computer games are responsible for

developing impatience inability to slow down and think things through to take time and listen. But, after reviewing your video I suggest that he may very well be developing very sophisticated listening skills necessary to deal with today's fast paced barrage of information and rapidly changing new communication technologies. Take for example, this almost 4 minute long random clip (view 25 second video clip, # 8) where Chris is working alone on a game which has quite a bit background music. There are 88 distinct sounds, each given as feedback as he negotiates his way through the game. This is a new sound every 3 seconds (on top of the music playing). Yet he is able to process all these sounds, understand what they mean, and respond to them quickly to adjust his play and continue the game. Is this deep entrance-like focus developing negative learning and communication skills (e.g., impatience) or positive learning and communication skills (e.g. listening)? What is your perception of this situation?

8. Or maybe the opposite. On many video clips I see Chris often clicking and moving on to the next challenge (view clip #3) before the computer finishes talking. Is this just because he knows what is going to be said won't help him, or that he already knows what the computer will say (he's been here before), or that he knows it doesn't matter if he interrupts the computer as opposed to a human being? Or as Heath suggests, is this creating impatient children in their face-to-face real world literacy instruction? Will not take time to concentrate and put the time and energy into less glitzy 'knee jerk reaction' type of resources, like books, that don't contain fast paced visuals and sound.
9. Do Chris and Liza use email or MSN Chat or other forms of social software? Do they send/receive email of any other forms of communication from others other than the occasional phone call (e.g., Webkinz)? Older children, researchers are discovering that tweens and teenagers are using these communication devices to maintain and forge social relationships. One would think that like Chris/Liza this is not happening, but it is in this clip (view clip #9) and observations that I've had at daycare with Chris and his friends. May not be through the Internet, but they are still using their experiences using these new tools to form identities and relationships in their social groups.
10. How is learning to be literate different for Chris? Draws upon older family members to get his answers (view clip #10a). He does a great deal of watching and listening to his siblings. All of his questions are geared towards being successful at the game. Challenges himself with information and games well beyond his age. He is impatient (view clip #10). He can move a lot and even dance and sing when the moment seizes him (view clip #10b). Reading is no longer just about reading text and getting clues from the still images, but it is derived from many different modalities that come together to support the learning of a word (visuals, spoken words, sounds, motion, clicking; view clip 10d.) If child runs into a problem the answer is often given just-in-time when the child needs it.

11. Watching these videos, can you think of anything else that you find different, surprising, interesting, about your child's literacy development, especially if you contrast it with your own?
12. Finally, [to parents] *you do not have to answer these questions if you do not wish to*,
  - a. What is your/your spouses age?
    - I) less than 20 years old
    - II) 20-30 years old
    - III) 30-40 years old
    - IV) 40-50 years old
    - V) more than 50 years old
  - b. What is your/your spouse's net personal yearly earnings (after tax)?
    - I) less than 35,000 CDN dollars
    - II) 35,000-55,000 CDN dollars
    - III) 55,001-75,000 CDN dollars
    - IV) 75,001-95,000 CDN dollars
    - V) greater than 95,000 CDN Dollars
  - c. What is your husband's personal yearly earnings after tax?
    - I) less than 35,000 CDN dollars
    - II) 35,000-55,000 CDN dollars
    - III) 55,001-75,000 CDN dollars
    - IV) 75,001-95,000 CDN dollars
    - V) greater than 95,000 CDN Dollars