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Stories of practice : preservice teachers' perceptions of information and communications technology

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**STORIES OF PRACTICE:
Preservice Teachers' Perceptions of
Information and Communications Technology**

By

Stephen Robert Hart

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ABSTRACT

This thesis investigates the perceptions of information and communications technology (ICT) held by four preservice teachers as they engage in their first field-based practicum. Perceptions result from interactions between the participants' educational beliefs about ICT and their field-based experiences with it. The research was conducted using qualitative research techniques derived from narrative and collective case study methodology. Questionnaires completed prior to the practicum, journal entries created during the practicum, and open-ended interviews conducted immediately after the practicum, provide contextualized biographical and narrative data.

Within-case analysis of the data resulted in the production of four individual case vignettes that reveal the significant experiences and prevailing beliefs of each participant. The narrative accounts render the participants' perceptions available and comprehensible to the reader. A cross-case analysis explores themes that hold across the four cases. It indicates that preservice teachers conceive ICT in terms of its perceived educational value and their perceived capacity to use it. These findings, it is suggested, can enlighten initial teacher education programs by informing theory, by informing practice, and by informing future research.

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CHAPTER 1

Introduction to the Research

This thesis presents the findings of an investigation into the perceptions of information and communications technology (ICT) held by four preservice teachers as they engaged in their first field-based practicum. More specifically, this research explores and reveals interactions between the participants' educational beliefs about ICT and their field-based experiences with it. Qualitative research techniques derived from narrative and collective case study methodology have been employed to gather and evaluate data. Questionnaires were completed by the four preservice teachers prior to the practicum, journal entries were created during the practicum, and open-ended interviews were conducted immediately after the practicum. Data derived from the above was used to elicit contextualized biographical and narrative data from the four participants. More specifically, the data was used to elucidate the meaning and significance of the participants' experiences with ICT in light of their beliefs about it, such that their perceptions became explicit. Ultimately, information derived from the data provides insights that contribute to the knowledge that informs initial teacher education programs.

The current chapter introduces the context of the study and identifies the conceptual framework that provided the inquiry with meaningful direction. Subsequently, the purpose of the research and the central questions that guided it are presented. An overview of the study's methodological approach is followed by a section that addresses the significance of conducting this research. Next, the delimitations and limitations that are inherent in the design of the research are made explicit, followed by a section that expresses my personal motivations for pursuing such an investigation. This chapter concludes by establishing definitions for the key terms used throughout the thesis.

Context of the Research

Information and communications technologies (ICTs) have come to play an important role in all phases of our lives. All segments of society are in some way affected by the ICT movement, and the domain of K-12 education is certainly no exception. In a recent survey, Plante and Beattie (2004) found that more than one million computers were available for educational use in K-12 schools across Canada. Nearly all Canadian K-12 schools are connected to the Internet, with an average student-to-computer ratio of 5:1 (Plante & Beattie, 2004). It would seem that Canadian schools are physically equipped for ICT integration.

The problem, according to Mumtaz (2000), is that despite an investment in infrastructure, schools have been slow at implementing ICT. The reality is that ICTs in K-12 schools are being underused (Cuban, 2001). Arguably, reluctance among teachers to adopt and integrate technology is a fundamental feature of this problem. Teachers, including those who are new to the profession, are often hesitant and do not feel capable of integrating it into their practice (Moursund & Bielefeldt, 1999; Yildirim, 2000). This observation has prompted some researchers to suggest that “Teacher preparation programs may be part of the problem” (Doering, Hughes, & Huffman, 2003, p. 342). Indeed, “A history of research reports indicate that preservice teachers are not being adequately prepared in educational technologies” (Doering et al., 2003, p. 342). Kay (2006) suggests that “preservice teacher education programs are a natural place to start with respect to integrating technology into education, particularly when there exists a strong infrastructure that supports computer use” (p. 384). But how should preservice teacher education programs prepare new teachers to use technology? Brief-exposure programs or workshops on technologies have proven unlikely to facilitate ICT adoption in the classroom (Mouza, 2003; Schrum, 1999). Professional development programs that

consider the contextual factors associated with schools, as well as the characteristics of individual teachers are required (Mouza, 2003). In order for ICTs to be used effectively in K-12 classrooms, teachers need to have positive computer attitudes and feel capable of using the technology (Milbrath & Kinzie, 2000). Although a variety of factors ultimately contribute to successful technology integration, “a critical component in meeting teachers’ technology needs is responding to teachers’ beliefs toward technologies” (Sugar, Crawley & Fine, 2004, p. 202).

Researchers have found that it would be wrong to assume that just because preservice teachers have grown up in the information age they will be prepared to integrate technology into their own classrooms (Schrum, Skeele & Grant, 2003). Indeed, it is a concern that the preconceived notions about ICT held by the current generation of preservice teachers may look a lot like those held by the previous generation of teachers. Pajares (1992) refers to this as the “resistant-to-change nature of educational beliefs.” (p. 324). The beliefs of preservice teachers are hard to change, as many of them enter professional education programs with preconceived notions about teaching based on their years in school as students. Wang (2002) supports this thinking, suggesting:

Preservice teachers’ perceptions of the teacher’s role are grounded in their beliefs about teaching and learning in general ... Preservice teachers’ beliefs about teaching and learning are primarily the results of their personal experience as students in the learning process (pp. 156-157).

Connecting this idea to teacher beliefs and the use of ICT, Yildirim (2000) asserts that “Teachers teach as they have been taught, and it is unlikely that computer skills will be transferred to students and encouraged by teachers unless the teachers have positive attitudes toward computer use” (p. 481). Underscoring this concern, Sime and Priestly (2005) assert that “Positive attitudes to the role of ICT in teaching are crucial in influencing teachers’ decisions to use technologies in their teaching” (p.140).

Accordingly, adequately preparing new teachers to use ICT should entail fostering supportive beliefs.

Recognizing that ICT adoption requires careful development and promotion of appropriate attitudes and beliefs, Milbrath and Kinzie (2000) suggest “it is essential to provide teachers with adequate computer training early in the education process” (p. 376). Since it is not possible to change the past K-12 experiences of prospective teachers, preservice education programs may be an appropriate place to provide experiences that promote positive attitudes and beliefs towards ICT integration. Indeed, numerous initial teacher education programs have made extensive efforts to prepare new teachers to use new technologies, “however the strategies used to attain these goals are complex, diverse, often conflicting, and rarely evaluated well” (Kay, 2006, pp. 384-385). Furthermore, research has largely overlooked how any of these diverse strategies interact with, and influence, preservice teachers’ ICT-related beliefs. Furthermore, largely overlooked has been how any of these diverse strategies interact with and influence preservice teachers’ ICT-related beliefs. Traditionally, most programs have attempted to simply expose preservice teachers to ICT through coursework. This has meant providing specific educational technology courses, as well as making efforts to infuse or integrate ICT into all preservice courses (Hargrave & Hsu, 2000; Kay, 2006; Moursund & Bielefeldt, 1999).

Field-based practicum experiences represent another avenue through which teacher education programs can expose preservice teachers to ICT. According to Strudler, McKinney and Jones (1999), while exposure to ICT in coursework lays a much needed foundation, integration of ICT into field-based experiences may be critical to preparing new teachers to utilize technology. Belson and Larkin (2004) think of the field-based practicum strategy as being particularly desirable because of its ability to provide “opportunities to practice a variety of technologies in a more realistic context” (p. 22). In

other words, field-based practicum experiences provide opportunities for authentic experiences. Despite this suggestion, little is known about the actual role field-based experiences play in preparing preservice teachers to use ICT. A recent literature review conducted by Kay (2006), that investigated teacher preparation programs' approaches to ICT, revealed that research focusing on students' practice in the field was significantly underrepresented. This study addresses that research gap by making the field-based practicum a focal point for inquiry into the interaction between preservice teachers' beliefs and experiences.

Conceptual Framework

According to Maxwell (1996) a conceptual framework introduces the system of concepts or assumptions that supports, and informs, a study. Not only does it identify concepts, it also shows the relationship that exists amongst them. The conceptual framework for this research is based on an integration of important concepts found in the review of the literature (see Chapter 2). Specifically, the constructs of belief and experience have emerged as being two fundamental aspects of the research concerned with preservice teachers' use of ICT. The conceptual integration of these constructs guided this research. For this research, *beliefs about ICT* and *experiences with ICT* are conceptualized as two interrelated components that together form preservice teachers' *perceptions of ICT*. This conceptualization, and choice of terminology, is derived principally from Wang's (2002) notion that (a) preservice teachers' perceptions are grounded in their beliefs; and that (b) preservice teachers' beliefs are primarily the result of personal experiences. Also considered in this framework is the understanding that beliefs influence how people create their own experiences and interpretations of reality. Collectively, these ideas produce a conceptual framework that suggests preservice

teachers' perceptions about ICT are the result of the interaction of their beliefs about ICT and their experiences with ICT.

Beliefs about and experiences with ICT represent what Bowen (2006) considers "sensitizing concepts" (p. 4). By forming an analytic structure, and serving as a point of reference for investigation, these sensitizing concepts together define the conceptual framework of the study. According to Bowen, such a conceptual framework provides a foundation on which the researcher can attempt "to discover, understand, and interpret what is happening in the research context" (p. 3).

One difficulty for research concerned with preservice teachers' beliefs lies in the multitude of definitions of the term (Pajares, 1992). According to Pajares,

defining beliefs is at best a game of player's choice. They travel in disguise and often under alias – attitudes, values, judgments, axioms, opinions, ideology, perceptions, conceptions, conceptual systems, preconceptions, dispositions, implicit theories, explicit theories, personal theories, internal mental processes, action strategies, rules of practice, practical principles, perspectives, repertoires of understanding, and social strategy, to name but a few that can be found in the literature (1992, p. 309).

The review of the literature, presented in Chapter 2, stands as a testament to this observation. Researchers concerned with ICT in education have conceptualized and approached beliefs under a variety of constructs, namely attitude (Milbrath & Kinzie, 2000), and anxiety (Ayersman, 1996), and self-efficacy (Albion, 1999). Often these constructs are defined within quantitative frameworks that aim to particularize and measure them. However, by employing one of these narrowly and rigidly defined constructs to the exclusion of the others, such literature presents only a partial understanding of the nature of beliefs about ICT. It is the contention of the researcher that a qualitative and exploratory approach is required in order to consider the totality of dimensions that comprise the notion of beliefs.

In fact, given the qualitative and exploratory nature of this research, it is deemed inappropriate to sharply define either of the sensitizing concepts (beliefs and experiences). These are loosely operationalized notions that are intended to provide initial direction and focus to an inductive study (Patton, 2002). This research purposely adopted broad, subjective, and holistic conceptualizations of beliefs and experiences such that the resulting framework facilitated an inductive and naturalistic approach to the investigation. Beliefs included the participants' feelings, convictions, emotions and opinions, and were understood as something that "cannot be directly observed or measured but must be inferred from what people say, intend, and do" (Pajares, 1992, p. 314). For this research, experiences are understood as activities or series of events that the participants live through. Within this conceptual framework, participants' experiences are considered particularly helpful in exploring their educational beliefs.

Purpose of the Research

The purpose of this research was to explore the interaction between the participants' (four preservice teachers) beliefs about ICT and their field-based experiences with it. Narrative and case study methodologies were employed to elucidate participants' experiences with ICT in light of their beliefs about it, such that their perceptions emerged. It was surmised that an understanding of the participants' perceptions may be of particular interest and value to initial teacher education programs.

Guiding Research Questions

The primary questions that guided the research are as follows:

1. How does each participant perceive the educational use of ICT during the field-based placement?
2. For each participant, what is the nature of the interaction between their beliefs about ICT and their experiences with ICT?

3. How can the findings of this research benefit initial teacher education programs?

The subsidiary questions that served to inform the primary questions are as follows:

- (a) What are the critical aspects of the field-based experiences that influence the development of participants' beliefs regarding the educational use of ICT?
- (b) What are the wider contextual factors that have influenced the participants' preconceived beliefs regarding the educational use of ICT?

Methodological Approach

In order to answer the above research questions, a qualitative study was conducted. Specifically, narrative inquiry informed the qualitative research methodology. Narratives were of particular value to this research because they “take into account not only current practices and situations but the past lives and experiences of teachers, and their future aspirations” (Geelan, 2003, p. 67). Narrative inquiry offered a way to penetrate participants' socially constructed realities and beliefs, and to shed light on the rich and complex interactions that embody their ICT related experiences. It was particularly useful as it enabled the researcher to interpret the meanings others have about the world and, rather than starting with a theory, to develop a pattern of meaning from those perspectives (Creswell, 2003). In other words, the research emphasized the importance of learning from the participants (Creswell, 2005).

This research incorporated multiple cases, as per a collective case study (Stake, 2000). It focused on four participants, all of whom were preservice teachers. Prior to data collection, a combination of purposeful and convenience sampling was employed to select four “information-rich cases whose study will illuminate the questions under study” (Patton, 2002, p. 230). In order to obtain rich and textured information from each

participant, multiple types of narrative data (questionnaires, weekly journal entries, and open-ended interviews) were collected. Triangulation and member checking were employed as a means of ensuring that findings were both accurate and credible (Creswell, 2005).

Once the data was collected, analysis consisted of within-case analysis and cross-case analysis (Merriam, 1998). The within-case analysis took place first, with each participant being “treated as a comprehensive case in and of itself” (Merriam, 1998, p. 194). For each participant, the associated questionnaire, journal, and interview data was analyzed to develop a rich description of the case. The within-case analysis took the form of a narrative analysis. According to Polkinghorne (1995), narrative analysis involves the organization of “data elements into a coherent developmental account” (p. 15). This approach entails “a synthesizing of the data rather than a separation of it into its constituent parts” (Polkinghorne, 1995, p. 15). Thus, the outcome of the within-case narrative analysis was the production of four individual case vignettes. Each vignette contextualizes an individual participant’s beliefs within a framework of experience that extends beyond the field-based placement itself. The temporal nature of the vignettes allows for an appreciation of how preservice teachers’ practicum experiences interrelate with their past experiences and beliefs to be rendered apparent for the reader.

Following the with-in case analysis, a cross-case analysis explored similarities and differences among the participants. This cross-case analysis resembled what Polkinghorne (1995) calls ‘analysis of narratives’ (p. 13). This is a paradigmatic analysis that “seeks to locate common themes or conceptual manifestations among the stories” (Polkinghorne, 1995, p. 13). It provides a method to uncover the commonalities that exist across cases, and “functions to generate general knowledge from a set of particular instances” (Polkinghorne, 1995, p. 14). Thus, the product of this stage of analysis was not

a story, but a description of the themes that hold across the four cases. This was an inductive process, and the findings emerged from the rigorous review of data compiled during the preliminary within-case analyses.

Significance of the Research

Attention to the beliefs of teachers and teacher candidates can inform educational practice in ways that prevailing research agendas have not and cannot. The study of beliefs is critical to education (Pajares, 1992, p. 329).

This research project recognizes the notion that the exploration of beliefs is critical to informing educational practice, and embraces its research potential. It also draws on the notion that experiences can help explain the development of educational beliefs (Pajares, 1992). Accordingly, the current study was designed to explore and reveal the interactions between the participants' educational beliefs about ICT and their field-based experiences with it. In doing so, it aimed to elicit insights into preservice teachers' perceptions about the educational use of ICT. Findings and conclusions emerged inductively as a result of an inquiry into the narratives of four preservice teachers. Knowledge derived from the work has the potential to help teacher educators become more aware of the process by which preservice teachers come to understand the educational use of ICT. These conclusions can inform theory and may contribute to improving preservice education.

There is evidence to suggest that "a critical component in meeting teachers' technology needs is responding to teachers' beliefs toward technologies" (Sugar et al., 2004, p. 202). Currently, little seems to be known about the nature of preservice teachers' beliefs towards educational ICT. In particular, there is a lack of understanding concerning the interaction between educational beliefs about ICT and field-based experiences with it. Preservice education, and particularly field-based practice, seems like an appropriate time

and place to begin to address beliefs pertaining to the educational use of ICT.

The knowledge generated from this research contributes to a theoretical understanding of how teachers construct educational beliefs concerning ICT. Furthermore, participants' stories of practice have the potential to contribute to the knowledge that informs meaningful field-based experiences and the educational use of ICT. In addition to filling gaps in the knowledge base, it is anticipated that the findings from this research may serve as an impetus for future research.

Delimitations

Merriam (1998) found “that the single most defining characteristic of case study research lies in delimiting the object of the study” (p. 27). The factors that established the boundaries of this collective case study included the following:

- (1) The research was confined to the perspectives of four preservice teachers.
- (2) Each participant was engaged in their first field-based practicum at the time of the study.
- (3) All four participants were in the 2007-2008 Junior/Intermediate (J/I) preservice teaching track at Lakehead University's Faculty of Education.

Limitations

It is recognized that the design of this research has inherent limitations. This work explored narratives within case boundaries and as such, the results can not be generalized beyond the four participants. Thus, the number of participants may be viewed as a limitation. A larger participant sample would have provided the opportunity to uncover the nuances of a greater number of realities. However, limiting the number of participants was also an inherent strength, as it allowed for a more in-depth examination and a thick description of each participant.

Since this research was concerned with field-based experiences, the proposed data collection interval was largely dictated by the practicum placement schedule of Lakehead University's Faculty of Education. Data was collected over a relatively short period of time with no longitudinal follow-up. Time constraints meant that the research was kept to a certain size and scope. Due to time limitations, observations of the participants in their field-based placements were not made. Furthermore, mentor teachers, faculty, and course instructors were not interviewed or consulted, although it is recognized that their perspectives would likely have added significant value to this research.

Another limitation stems from the study's reliance on written and verbal narratives supplied by the participants. Ultimately, the participants' ability to articulate their beliefs and recall their past experiences influenced the research. Among the four participants, there were varying levels of communication and recall ability. As a result, the degree of detail provided about personal information, beliefs, and experiences varied among the participants.

Trustworthiness

This research sought trustworthiness to support the claim that the investigation's findings are "worth paying attention to" (Lincoln & Guba, 1985, p. 290). According to Lincoln and Guba (1985), the trustworthiness criteria for any qualitative research project can be summarized as credibility, transferability, dependability, and confirmability. When satisfied, these four criteria serve to establish confidence in the findings of the research. In this research, the Lincoln and Guba (1985) trustworthiness criteria was satisfied by using the strategies detailed below.

Establishing the credibility criterion involves making certain that the research findings represent a credible and believable interpretation of the data drawn from the

participants. According to Lincoln and Guba (1985, p. 314), member checking is “the most crucial technique for establishing credibility.” This technique allows the participants to judge the credibility of the results. This “is a qualitative process during which the researcher asks one or more participants in the study to check the accuracy of the account” (Creswell, 2005, p. 594). During all interviews, the researcher verbally summarized key points to confirm accuracy. As part of the member checking process, the participants also had the opportunity to review their questionnaire responses, journal entries, and interview transcripts. The participants were free to retract, exclude, or edit their data to ensure accuracy. Furthermore, the participants were given the opportunity to review their final case-study vignettes in order to assure that their voices were accurately represented by the researcher.

Transferability refers to the degree to which the findings of an inquiry can apply or transfer beyond the bounds of the project. Lincoln and Guba (1985) describe transferability as whether or not the results can be useful or helpful in another situation. Attaining transferability is analogous to what Stake (2000) calls “naturalistic generalization” (p. 442). This naturalistic approach is centered on a more intuitive, empirically-grounded form of generalization. This argument is based on the notion that reading a researcher’s rich case account provides opportunity for vicarious experience and thus the construction of knowledge. Stake suggests that the results of case studies can resonate with a broad cross-section of readers, thereby facilitating a greater understanding of the phenomenon being studied. This is consistent with Lincoln and Guba’s view that transferability is associated with the degree to which a study employs “thick description.” The readers of this collective case study should be able to, on the basis of the thick description of the individual cases provided, determine how the lessons learned from the research are applicable to other contexts. In effect, the transferability of the findings is

largely the responsibility of the reader. Ultimately, the onus is on the reader to draw inferences from the findings and to determine if those inferences are relevant to other situations. However, by articulating the initial findings of this study in the form of detailed and contextualized narrative cases, the researcher accepted the responsibility of making transferability feasible.

Dependability refers to the quality of the integrated processes of data collection, data analysis, and theory generation. Methods for data gathering, analysis and interpretation are described in great detail to increase the dependability of the research. Towards this end, the researcher took “into account both factors of instability and factors of phenomenal or design induced change” (Lincoln & Guba, 1985, p. 299). All phases of the research, both expected and unexpected, were documented and made explicit in this report.

Confirmability refers to the degree to which a study’s findings are supported by the data collected. This research utilized triangulation as a means of ensuring confirmation and completeness of the data. Three sources of qualitative evidence are deemed more compelling than one source of data. Thus, this research triangulated three methods of data collection (questionnaires, journal entries, and interviews) from each participant. This allowed the researcher to check for consistency, corroborate findings, and make confirmations across methods. Triangulation also helped to achieve verisimilitude in the descriptions of participants and contexts, thus helping to ensure the overall trustworthiness.

Personal Ground

My interest in the topic of this study was derived largely from my professional and academic experiences. Specifically, four experiences led to this qualitative inquiry

regarding preservice teacher's perceptions of technology integration: (a) working in the information technology sector as a technical representative and product consultant, (b) volunteering in schools as a computer literacy tutor, (c) being a student in a preservice teacher education program, and (d) serving as a graduate assistant for a preservice educational technology course. The process of discovering the research problem and realizing and adjusting my inherent assumptions follows.

Prior to pursuing a career path in education, I had completed an undergraduate degree in Computing and Information Science then worked briefly as a product consultant in the information technology sector. These two experiences provided me with exposure to the diverse range of issues that surround the use of computer technology in our society. During my academic experience I took particular interest in the topic of computer-human interaction. I found issues pertaining to the educational application of computer technology to be particularly intriguing. In my workplace position, I often worked with representatives from K-12 schools that had invested vast amounts of money acquiring technology for educational purposes. In many of these encounters I came to realize that the technology that had been purchased was not being used to its full potential. I came to understand that in numerous situations computer technology had been acquired by schools as a result of available funding, but that often no corresponding plan for implementation existed. Thus, in many cases it was my perception that the technology was often being underused or not being used at all.

Past experiences as a computer literacy tutor in elementary schools tended to reinforce this concern. Many of the teachers that I interacted with as a tutor were hesitant to use the computer technology that their school had purchased. In some circumstances, teachers were completely unaware of the existence of the technological resources that were available to them. In other situations, administrative and institutional barriers

prevented technology-savvy teachers from acting on good intentions. My initial, and perhaps naïve, assumption was that this struggle regarding technology implementation was the result of a generation of educators and administrators who were unfamiliar with and unwilling to adapt to new technology. However, later as a student in a preservice teacher education program, I came to realize that even the new generation of educators seemed to struggle with the adoption of educational technology.

During the first term of my one-year teacher education program, I enrolled in an elective course entitled “Technology in the Classroom.” This was an innovative course that combined both online and in-class components to deliver content that pertained to the educational application of ICT. Technology was infused into the coursework, and appropriate use of ICT was modeled by the instructor rather than passively taught. Considering the pedagogically progressive and technological relevant nature of this course, I was shocked by the resistance that many of my classmates demonstrated towards integrating technology into their own lessons. I struggled to understand why this was the case. The impression I got was that these classmates, although familiar and comfortable with the use of computer technology in their personal lives, were not easily convinced of the value technology held for educational settings. Out of curiosity, I would often inquire into these individual’s perceptions regarding ICT and listened to their stories with interest. Through this informal process, I came to suspect that their resistance was the result of deeply-seated preconceived beliefs concerning the educational use of ICT. The experiences instigated by the educational technology class were challenging these beliefs. In my view, experiences and beliefs were interacting. Interestingly, by the end of that one term course, many of my classmates had started to cultivate more positive attitudes toward the educational use of ICT. For me, this was an indication that their beliefs *about* educational ICT had evolved as a result of experience *with* educational ICT.

Following that first term course, I was fortunate to have two very positive field-based experiences that reinforced my beliefs and ideas concerning the value of educational technology. In both of my practicum placements I observed my associate teachers using technology in their teaching. These mentors also encouraged me to experiment with the computer technology that their elementary schools had invested in. I was personally invigorated by such encouragement, and came to recognize first-hand the value of technology infusion in the classroom. Students were generally enthusiastic about lessons that incorporated computer technology, and my formative assessment of their tasks suggested that they were benefiting from such activities.

My positive placement experiences with technology integration, however, did not seem to be the norm. Communication with other preservice teachers, including those who had taken the “Technology in the Classroom” course, led me to understand that the modeling and use of technology in the field-based practicum may not have been common practice. My insight and concern was that in some situations, the placement experiences may have actually reinforced negative attitudes toward the adoption of educational computer technology. During their field-based practicum placements, many of my classmates never entered school computer labs or made use of in-class computer stations. It seemed that for many of my classmates there was a clear disconnect between the values expressed in the professional program and the reality of the classroom. I was concerned that the negative or neutral perceptions about educational technology that some people had entered the program with were being perpetuated and reinforced by their field-based experiences. In other cases I was concerned to hear that initially positive inclinations turned negative as a result of field-based experiences that discouraged technology use. In all cases, I suspected the interaction of experiences and beliefs. Within this process, individuals’ beliefs about educational ICT were being prompted to either evolve or

solidify. Preconceived beliefs about ICT (constructed from prior experiences with ICT) were interacting with new experiences to define present beliefs.

The fourth experience leading to this inquiry involves my work thus far as a graduate student. During my first year of the Master of Education program I had the opportunity to work as a graduate assistant in the same “Technology in the Classroom” course that I had taken myself as a preservice teacher. In this capacity, I was able to work closely with preservice teachers who were learning to incorporate technology into their pedagogy. I discovered that they had varying beliefs and comfort levels regarding the process of integrating technology. In general, I perceived a high level of ignorance towards the use of technology in education. I found that prior to taking this educational technology course, few of these preservice teachers had actually been exposed to concrete examples of effective ICT integration. The K-12 teachers who had taught this new generation of teachers had generally avoided the use of technology, and it seemed as though that approach had been passed along. By way of modeling ICT use in this specific course, I saw the attitude among many preservice teachers start to change in a positive way. Although pleased with this progress, I remained concerned about the ideas and beliefs about ICT that the field-based portion of the program conveyed to students.

This experience as a graduate student, combined with my aforementioned professional and academic experiences, influenced my personal desire to learn more about the challenge of educating teachers to integrate ICT. By researching the problem further in the literature, I realized that many of my insights were supported by empirical observations made by others. Furthermore, my review of the literature revealed that the role of the field-based practicum in nurturing the use of technology in the classroom, something that my personal experiences had indicated as being important, had been largely unexplored. I felt that it was imperative that a research project address this gap.

As a result of my interaction with others, it was my perception that narratives, supplied by preservice teachers reflecting on their own experiences, may be of particular value to such an inquiry. What followed was the construction of the current research study in which a better understanding of the interaction between the participants' educational beliefs about ICT and their field-based experiences with it was sought.

Definition of Key Terms

To assist readers in the comprehension of this research, the following terms are operationally defined to clarify their meaning within the bounds of this study. Included here are terms that are unique to this inquiry or that might not be initially understood by the general reader. Where applicable, definitions are drawn or adapted from scholarly or institutional sources. In an attempt to maximize fluency of understanding, these definitions are presented in hierarchal order rather than alphabetical order.

ICT – ICT stands for Information and Communications Technology. For this study “ICT includes technologies such as desktop and laptop computers, software, peripherals and connections to the Internet that are intended to fulfill information processing and communications functions” (Statistics Canada, 2007, ¶ 1). Electronic audio and video devices also fall under this grouping. The definition used in this study is purposely broad, and is consistent with “the range of tools and techniques relating to computer-based hardware and software; to communications including directed and broadcast; to information sources such as CD-ROM and the Internet, and to associated technologies such as robots, video conferencing and digital TV” (Hardy, 2000. p. 3). In academic, educational, and industry discourses, ICT is often used interchangeably with terms such as *online technology*, *web-based technology*, *Internet technology*, *information technology (IT)*, *information age technology*, and *digital technology*.

Educational ICT – For the purpose of this research, educational ICT is operationally defined as information and communications technology that is used in an educational environment or context. These are ICTs that are used to facilitate teaching and learning. Educational ICT include multimedia devices and electronic audiovisual tools that are used to support educational objectives. Educational ICT is sometimes used interchangeably with terms such as *educational technology*, *instructional technology*, and *e-learning technology*.

Preservice teacher – This term is used to refer to a student enrolled in an initial teacher preparation program. Analogous terms include *teacher candidate* and *student teacher*. A preservice teacher is not a certified teacher, but a prospective teacher who is engaging in formal training.

Experience – In the context of this study, experience is operationally defined as an activity or series of events participated in or lived through by an individual. Experiences are conceptualized as the “critical episodes and images” held by teachers, and are understood as being important to the development of their educational belief structures (Pajares, 1992, p. 310). Not only can experiences lead to the formation and accumulation of beliefs, they also have the ability to influence perspective. The word “experience” comes from the Latin *experiri*, meaning “to try out.” The act of trying (or lack there of) can influence an individual’s beliefs, which in turn can influence their perspectives.

Field-based practicum – This refers to a required component of most teacher preparation programs during which preservice teachers are placed in regular classroom settings. Such placements are intended to provide preservice teachers the opportunity to learn, through authentic experiences, the complexities of teaching. These field-based placements, which take place under the supervision of an associate teacher, are

sometimes referred to as *practice teaching* or *student teaching*. In this study, *field-based practicum* and *field-based placement* are used interchangeably.

Narrative inquiry – “Narrative inquiry is a way of understanding experience ... a collaboration between researcher and participants, over time, in a place or series of places, and in social interaction with milieus ... Simply stated ... narrative inquiry is stories lived and told” (Clandinin & Connelly, 2000, p. 20).

Beliefs – For this study, beliefs refer to the propositional attitudes that shape preservice teachers’ experiences of reality. More specifically, they will be feelings, convictions, emotions, or opinions toward educational ICT. Beliefs are something that “cannot be directly observed or measured but must be inferred from what people say, intend, and do” (Pajares, 1992, p. 314). An individual’s attitudes, anxieties, and self-competencies toward ICT embody their beliefs about ICT.

Perceptions – Perceptions refer to the ideas, thoughts and feelings from the preservice teacher’s point of view, drawn from experience. For the purpose of this research, perceptions are operationally defined as the product of an ongoing interaction between an individual’s beliefs and experiences. A preservice teacher’s impressions and reactions to educational ICT, as expressed in their narratives, represent their perceptions of educational ICT.

Case study – A case study is an in-depth empirical inquiry into a phenomenon or general condition that involves the exploration of a particular real-life context or individual.

Collective case study – This refers to a case study that considers several different cases in order to inquire into a phenomenon or general condition. Accordingly, it can also be referred to as a multiple case study. In this particular study there are four individual cases, each of which is represented by a different preservice teacher.

Within-case analysis – This technique for analyzing collective case studies involves first treating each case “as a comprehensive case in and of itself” (Merriam, 1998, p. 194). Each case is initially analyzed independently and a detailed description is produced.

Cross-case analysis – This technique for analyzing collective case studies involves examining data across cases to discern elements that are common to all cases. More specifically, it represents a thematic analysis across cases (Creswell, 2007).

Concluding Remarks

This chapter introduced the context of the research project and outlined a conceptual framework. The purpose of the research and the central questions that guided it were presented. Furthermore, a methodological approach was established and summarized. Delimitations and limitations inherent to the design were made explicit, and the researcher’s personal motivations for pursuing this topic area were presented. The chapter concluded with definitions for some key terms used throughout the thesis.

The literature review of the next chapter seeks an appreciation for the broad base of literature concerned with ICT integration. Organized into three main sections, it speaks to the literature that informs this research.

CHAPTER 2

Review of the Literature

Although my personal and professional experiences, outlined in Chapter 1, provided the initial impetus for the current study, a review of the literature provided the foundation on which the study could move forward. Indeed, an appreciation for the broad base of literature concerned with the role of information and communications technologies (ICTs) in education underlies this study. The current chapter, which is organized into three main sections, reports on and appraises the literature that informs this thesis. In constructing this review of the literature, an effort was made to concentrate on the most relevant published work, and to organize it in a logical and meaningful fashion. Following the advice of Creswell (2005), this review is primarily based on research reported in refereed journal articles, but also contains information drawn from published books, conference papers, and government documents. Furthermore, when possible and where applicable, an effort was made to include Canadian content in the review.

The first section of this literature review explores the notion of schooling in the information age. The current status of ICTs in Canadian and international schools is considered, along with some prevailing trends observed by contemporary researchers. The first section is used to explain the current educational context in which new teachers are being asked to respond to technology. The second section presents literature that considers the role of teacher training in addressing issues of ICT implementation, and reveals the significance of teachers' beliefs in that process. The third section of this review considers the responsibility preservice education programs have in preparing new teachers to use ICT. It is revealed that while the literature considers the field-based components of such programs to be particularly important, holistic and contextualized

understandings of why this is the case appear to be lacking. This chapter concludes with a summary that delineates key ideas drawn from the review of the literature.

Schools of the Information Age

The information age is upon us, and the computer technology that constitutes and defines it influences almost every element of our society. Information and communications technologies (ICTs) have come to play an important role in all phases of our lives. Global economic change, driven largely by the technological growth of the information age, continues to drastically alter our work, civic, and personal lives (Castells, 2000; Mehlinger, 1995). ICTs permeate our professional, as well as our personal lives. It is hard to find a segment of society that has not been influenced by technology in some way. It seems as though technology is everywhere, and our schools are certainly no exception. Mehlinger (1995) claimed that “Information Age technology is the single greatest factor affecting the way we live; it cannot help but to alter the way we conduct schooling” (p.21). This statement, made over a decade ago, still resonates clearly today.

Educational Reform and ICT

Over the last decade, school systems around the world have been undergoing major educational reforms. Running parallel with educational reforms has been the “educational ICT revolution” (Venezky & Davis, 2002, p.5). Consequently, we have witnessed the injection of ICT into schools become a key component of educational change throughout the world. Many countries are working to install networks in schools, connect them to the Internet, acquire educational software, and prepare ICT-savvy teachers (Plante & Beattie, 2004; Venezky & Davis, 2002). A review of literature concerned with the impacts and benefits of ICT infusion reveals that these are topics of

considerable contention. Some researchers have argued that computers have had a negligible or even negative impact on education (Armstrong & Casement, 1998; Cuban, 2001; Oppenheimer, 2003; Postman, 2000; Rothenberg, 1998). While other researchers have pointed out that when used properly, computer technology has the ability to positively impact student outcomes (Breuleux, 2001; Higgins, Moseley & Tse, 2001; Tapscott, 2001).

Despite the debate, governments have been sufficiently optimistic as to the potential that technology holds to improve educational outcomes that they have established task forces and dedicated substantial funds to promote its use in schools (Sclater, Sicoly, Abrami & Wade, 2006). Evidence suggests that Canada is no exception to this documented trend. Programs such as the federal government's *SchoolNet*, established in 1994 and touted as an international model, have aimed to make Canada the most connected nation on earth (Shade & Dechief, 2004). Another federal initiative, the *Computers for Schools* program, implemented in 1993, has served as a means of channeling computers donated from government and private corporations into Canadian classrooms. Commenting on these government programs, Shade, Porter, and Sanchez (2005) suggest that

The initial hype about the Internet from policymakers, educators, and pundits in the Canadian context focused on its use as a valuable educational tool for young people in the "knowledge-based economy." Schools eagerly jumped on the Internet bandwagon, and in Canada government programs such as *SchoolNet* and *Computers for Schools* actively promoted the adoption of the Internet for educational betterment (pp. 505-506).

Fueling the government technology initiatives was the notion that widespread connectivity would result in enriched educational pedagogy and the creation of future employment opportunities (Shade & Dechief, 2004).

Milton (2003) aptly notes that "The early drivers of levels of investment in ICT in

education have not changed” (p. 2). According to Milton, there are three key factors driving technology investments in the K-12 sector in Canada: (a) the notion that both individuals’ employment success and national economic growth are dependent on ICT skills, (b) the rapid appropriation of ICTs for personal use among the general population, and (c) the belief that ICT has the potential to improve the quality of teaching and learning. Taken together, these factors serve to explain the ever-increasing presence of computer technology in Canadian and international K-12 schools.

In a recent *Information and Communication Technologies in Schools Survey (ICTSS)*, Plante and Beattie (2004) found that more than one million computers were available for educational use in K-12 schools across Canada. The *ICTSS*, conducted by Statistics Canada, revealed that nearly all Canadian K-12 schools are connected to the Internet, with an average student-to-computer ratio of 5:1 (Plante & Beattie, 2004). This is consistent with findings in the United States. In 2000, the average student-to-computer ratio in public schools was also 5:1, down from 6:1 in 1999, and down from 125:1 in 1983 (Cattagni & Farris Westat, 2001; Mayer, Mullens & Moore, 2000). Although Canada and the United States appear to be clear leaders in the push to place technology into schools, European countries have also been part of this trend. By 2000, most European countries had an average student-to-computer ratio somewhere between 5:1 and 20:1 (Eurydice, 2004). Seven countries (Denmark, Luxembourg, Finland, Sweden, the United Kingdom, Liechtenstein and Norway) had a student-to-computer ratio of 10:1 or less (Eurydice, 2004).

The Reality of ICT Use in Schools

What has been the outcome of this strong ICT presence in our schools? Corbett and Willms (2002) offer a Canadian perspective, suggesting that “Policy-makers in

Canada expect that the introduction of ICT in education will improve academic performance, improve equity among students, and improve students' ability to use and apply technology and software in their future employment" (p. 4). Highlighting the position of policy-makers, Corbett and Willms (2002) report that students' use of ICT in education "is considered an important indicator of their preparedness to succeed and excel in the future (p. 3). However, Milton (2003) suggests that the optimistic belief that ICT has the potential to improve the quality and productivity of education is being challenged. According to Milton, the initial large investments in ICT have not resulted in enhanced educational outcomes such as improved student achievement. Although the numbers suggest that computer technology is present in schools, researchers have noted that equipment and connectivity alone do not guarantee successful implementation (Cuban, 2001; Granger, Morbey, Lotherington, Owston & Wideman, 2002; Ertmer, 1999; Marcinkiewicz, 1994; Mouza, 2003; Oppenheimer, 2003; Office of Technology Assessment, 1995; Rakes, Field & Cox, 2006; Sasseville, 2004; Zandvliet, 2006; Zappone, 1991). Ertmer (1999) highlights this prevailing realization, asserting that "Achieving technology integration is a multifaceted challenge that entails more than simply acquiring and distributing computers" (p. 53).

Reporting from within an American context, Mouza (2003) observes that although education systems progressively invest more and more in new technologies, "the actual use of computers in the classroom remains meager" (p. 272). This was essentially the same as the message given eight years earlier by the US based Office of Technology Assessment (1995), which reported that "despite technologies available in schools, a substantial number of teachers report little or no use of computers for instruction" (p. 1). In Canada, studies conducted in Quebec by the Conseil supérieur de l'éducation (2000), as well as Karsenti, Peraya, and Viens (as cited in Sasseville, 2004),

indicated that although ICT was available in almost every primary and secondary school in the province, only a little over fifty percent of teachers made use of it. Sasseville (2004) regarded this as a “disturbing fact” considering the millions of dollars the Quebec school system was spending on ICT. Sasseville’s findings were congruent with those of Marcinkiewicz (1994), who found that almost half of his sample (170 elementary teachers in an eastern US state) did not use computers for teaching. A study conducted by Becker and Ravitz (2001) that considered ICT integration among secondary school teachers had even more dismal findings. Of the sample Becker and Ravitz studied, only 25 percent of secondary English teachers, 17 percent of science teachers, 13 percent of social studies teachers, and 11 percent of math teachers used computers in their classroom instruction on a weekly basis. Interestingly, Marcinkiewicz’s study also revealed that nearly all of the participants who did integrate computers into their teaching were doing so at a level where the computers were practically expendable. This raises the additional concern that even when computers are regularly used in the classroom, they may rarely be used as tools to help students develop higher order thinking.

Referring to similar observations throughout the United States, Cuban (2001) claims that “Computers have been oversold and underused, at least for now” (p. 179). The contention is that during the past two decades, computers have been oversold by policy makers and ICT promoters, overbought by school systems, and underused by those in education (Cuban, 2001). According to this argument, “most teachers and students now have far more access than previously, but classroom use continues to be uneven and infrequent” (Cuban, 2001, p. 93). For Cuban, investment “has yet to produce worthy outcomes” (2001, p. 197). Zandvliet (2006) takes a similar stand, suggesting that the huge investment in school computer technology has resulted in wasted potential. Zandvliet (2006) suggests that there are literally thousands of computer labs in schools

around the world that are not influencing teaching in the way envisioned by school reforms. His argument complements the findings of Armstrong and Casement (1998), who suggest the money invested in technology has been reckless, stating that “vast sums of money are still being spent in our education system on integrating a technology whose effects are unproven and in many respects counter productive” (p. 83). Such findings bring to light a challenging educational paradox: although schools have high access to ICT, the technology is not being used to improve teaching and learning.

Given the strong physical presence of ICT in schools, it seems reasonable that if we can address the factors preventing it from being used effectively, then we will have good reason to be optimistic. In fact, contrary to the position of Armstrong and Casement (1998), research findings over the past two decades provide abundant evidence of positive effects associated with the use of ICT (Mumtaz, 2000). Several meta-analysis studies have found that educational ICT has positive effects on student learning (Blok, Oostdam, Otter & Overmaat, 2002; Kulik & Kulik, 1991; Waxman, Lin & Michko, 2003). Positive effects have included enhanced cognitive outcomes, increased speed of learning, improved engagement and motivation, and improved student achievement. Such research supports the notion that ICT can in fact be used effectively in educational contexts. The problem, according to Mumtaz (2000), is that, despite an investment in infrastructure and training, schools have been disappointingly slow to effectively implement ICT. Arguably, reluctance amongst teachers to adopt and integrate ICT represents a fundamental feature of this problem. Teachers need to be viewed as critical variables in the process of adoption and integration (Sugar et al., 2004). This is to say that before ICT can be effectively integrated into classrooms, it must first be accepted by the teachers who occupy those classrooms.

The reality is that ICTs are here to stay. ICT integration has become intertwined

with, and sometimes indistinguishable from, educational reform (Venezky & Davis, 2002). We know that technology is having an impact on our world (Roberts & Ferris, 1994), and that it is also having a considerable influence on the future of education (Milbrath & Kinzie, 2000). Oppenheimer (2003) aptly concludes that ICTs are not going to disappear and that “The challenge for schools, therefore, is to be smarter about how and when they use technology” (p. 393). Given this challenge, it seems logical to address issues that concern the training of teachers. If teachers are the critical variable in ICT implementation (Sugar et al., 2004), then it is imperative that they are prepared for the task. Otherwise, we as a society run the risk of having the “educational ICT revolution” (Venezky & Davis, 2002, p.5) amount to little more than a process of acquiring and distributing technology which is destined to sit idle. Bosch and Cardinale (1993) aptly summarize the crux of this notion, stating simply that “Technology is not self-implementing” (p. 25). Teachers are responsible for deciding when and how technology is used in the classroom. Accordingly, it seems reasonable to expect that teacher training programs should strive to prepare teachers for the task of ICT implementation.

Professional Development for Teachers

Nearly two decades ago, the United States’ Office of Technology Assessment (1988), indicated that adequate teacher training was “the most important ingredient affecting implementation of new technology” (cited in Brownell, 1997, p. 118). The literature that has been produced since that time continues to reflect a consensus that there is a need for technology training by way of teacher preparation programs and ongoing professional development. Reminiscent of earlier suggestions, Mouza (2003) claims that “Professional development is a critical ingredient in effective use of technology in the classroom” (p. 274). Research has recommended that preservice and

inservice professional development are needed to provide teachers with the skills necessary to successfully integrate technology (Mouza, 2003; Yildirim, 2000). Making reference to previous research on the subject, Brownell (1997) proposed the lack of adequate teacher training to be the “biggest obstacle to the use of technology in education” (p. 118). Perhaps not surprisingly, by the turn of the 21st century Stetson and Bagwell (1999) reported that technology training was one of the most demanded staff development topics provided by school districts in the United States. Teacher training initiatives, it would seem, were viewed as a reasonable way to respond to the increasing presence of ICT in schools. Indeed, training has been identified as one way to overcome barriers to ICT implementation (Russell & Sorge, 1999), yet some researchers have found that it fails to do so (Rakes et al., 2006).

On the positive side, research indicates that ICT training efforts have the potential to enhance teachers’ self-confidence in the use of instructional technology (Russell & Sorge, 1999). However, it is important to note, as Mouza (2003) does, that only under certain conditions may this be the case. The existence of a training program alone does not guarantee the successful preparation of technology-savvy teachers. The nature of the training program being offered can be very important. Stetson and Bagwell (1999) suggested that most training initiatives have related to addressing the basics of hardware and software use. Similarly, Cope and Ward (2002) observed that keeping experienced teachers’ technical knowledge current has been the traditional focus of professional development programs. This, however, may represent weaknesses in the design of many professional development courses. Research indicates that in focusing on basic ICT skills, professional training programs may be failing to prepare teachers to integrate ICT into their pedagogy (Mouza, 2003; Van Fossen 1999; Wild 1996). Mouza (2003) suggests that traditional “sit-and-get” professional development training sessions, which

often take place outside of a school context and have no follow-up support, are part of the reason teachers have failed to integrate ICT into their teaching.

Brief-exposure programs or workshops on technologies are unlikely to facilitate ICT adoption in the classroom (Mouza, 2003; Schrum, 1999). Professional development programs that consider the contextual factors associated with schools, as well as the characteristics of individual teachers are required (Mouza, 2003). This supports the findings of Veen (1993a), who concluded that differentiated programs are needed to respond to teachers' varying levels of computer experience and learning styles. The notion underlying these findings is that professional training that fails to address the teachers' specific needs will not be effective. What becomes evident is that the individual teacher, along with the professional training they have received, plays a critical role in the technology adoption and integration process.

The Role of Beliefs

Ultimately it is individual teachers who decide if, and how, they are going to use technology in their classrooms (Sugar et al., 2004). What determines if a teacher will adopt ICT in their instruction? Research conducted by Veen (1993b) found that teachers' beliefs were paramount to explaining their use of computers. Although Veen (1993b) found skills to be important, they were not shown to be as important as beliefs. It appears that successful use of technology in teaching requires more than mastering computer-handling technical skills (Veen, 1993b; Wang, 2002). In fact, Veen (1993b) found that computer-handling technical skills were even less influential than skills associated with teachers' classroom management or pedagogical style. Although a variety of factors ultimately contribute to successful technology integration, "a critical component in meeting teachers' technology needs is responding to teachers' beliefs toward

technologies” (Sugar et al., 2004, p. 202).

Both qualitative and quantitative data collected by Sugar et al. (2004) indicated that within their sample population, individual attitudes of teachers towards technology adoption were the key determinants of whether technology was, or was not, embraced. Underlying personal beliefs about the consequences of technology adoption influenced these attitudes (Sugar et al., 2004). Rakes et al. (2006) expanded on this notion by suggesting that “Teacher beliefs concerning their personal ability to effectively use technology and their beliefs regarding the potential effect on student achievement is quite possibly a significant factor in determining what actually happens in the classroom” (p. 422). This statement is significant, as it reveals that teacher beliefs concerning ICT are constructs comprised of multiple dimensions. These complex belief structures represent ways of thinking that can ultimately influence action. For Rakes et al. (2006), beliefs about personal ability with ICT and perceived outcome of ICT implementation are understood to play an important role in determining if and how a teacher makes use of ICT. A review of the literature indicates that previous studies have employed a variety of perspectives to assess the technology beliefs’ of in-service and pre-service teachers. The diversity of approaches toward conceptualizing beliefs, as highlighted by the following subsections, reveals their complexity.

Attitudes

Several studies have looked at the role of attitudes (Sugar et al., 2004; Fabry & Higgs, 1997; Milbrath & Kinzie, 2000). Sugar et al. (2004) indicate that

Attitude toward a behavior reflects an individual’s personal disposition toward engaging in the behavior and represents the individual’s assessment of the personal beliefs regarding the target behavior’s effectiveness in producing favorable and unfavorable outcomes, each outcome weighted by a personal evaluation of the outcome (p. 203).

Attitudes towards implementing ICT, therefore, can be a deciding factor in itself, or it can influence, as well as be influenced by, other factors. According to Milbrath and Kinzie (2000), “attitudes, values, and self-judgments can exert a profound effect on behaviors” (p. 374). Marcinkiewicz (1994) found that of a number of attitude related variables, self-competence (belief in ability) and innovativeness (a willingness to change) were most closely related to computer use among the 170 elementary teachers he surveyed. Another factor Marcinkiewicz (1994) found to influence teachers’ motivation to use technology in their teaching was their perception of the relevance of computers to teaching. Similarly, Fabry and Higgs (1997) suggested that attitudes could be divided into three groups: self-confidence with ICT, perceived relevance of ICT, and innovativeness.

The work of Snoeyink and Ertmer (2001) pointed to previous computer experience as being particularly important in shaping the character of such attitudes. This experience could stem from a variety of contexts, including those associated with personal computer use or formal computer training. What seems evident, and of particular significance, is the notion that positive experiences with ICT can result in the formation of positive attitudes towards ICT. According to Yildirim (2000), teachers who have positive attitudes toward technology will be more inclined to use it in their future teaching. Thus, from a standpoint of leveraging Canada’s strong ICT infrastructure in schools, teachers’ positive technology experiences can be viewed as advantageous. The concern is that negative experiences with ICT could affect teachers’ perceptions of the difficulty and relevance of ICT implementation, which in turn could presumably reduce confidence and increase anxiety.

Computer and Technology Anxiety

Computer anxiety has been identified a key obstacle for teachers’ technology

adoption (Ayersman, 1996). Research conducted by Ayersman (1996) not only concluded that computer anxiety is common among preservice and practicing teachers, but that many suffer from it at substantially high levels. Some teachers may perceive the increasing presence of ICT in schools as a threat and unwelcome challenge, thus responding to it with negative attitudes and anxiety. The presence of ICT and the expectation to implement it into instruction can be an intimidating challenge to some educators. Bandura (2000) explains that there are emotions that are elicited when one faces a challenge, “People who believe that they can manage threats are not distressed by them ... [while] ... People who believe they cannot control them experience high anxiety” (p. 20). Fabry and Higgs (1997) contend that often found underlying these anxieties are fears of losing professional status through a reduction of traditional pedagogical skills. The perceived or believed personal demands associated with change, resulting from the implementation of ICT, are what results in anxiety. In turn, this anxiety acts as a barrier to the adoption and integration of new technologies in schools (Ayersman, 1996).

Self-efficacy and Confidence

Compeau and Higgins (1999) suggest that one factor that predicts the existence of computer anxiety is low self-efficacy. Self-efficacy forms another important focus within the literature on the topic of teacher beliefs regarding technology integration. Compeau and Higgins (1999) define self-efficacy as “the belief that one has the capability to perform a particular behavior” (p. 189). Thus, ICT self-efficacy, in the context of education, can be understood as a belief that one has the capability to use ICTs in teaching. Albion (1999) understood self-efficacy beliefs of teachers to be “an important, and measurable, component of the beliefs that influence technology integration” (p. 2).

Milbrath and Kinzie (2000) recognized both computer anxiety and low self-efficacy as being a big deterrent to computer adoption for educators. In a quantitative longitudinal panel study, conducted with a group of preservice teacher candidates, Milbrath and Kinzie (2000) looked at the relationship between computer training, perceived self-efficacy, and computer use over time. Their findings suggested that as the frequency of computer use stopped increasing so did perceived self-efficacy. For them, this indicated a relationship between perceived self-efficacy and the frequency in which computers were used. This observation was consistent with findings from Albion (1999), who pointed to frequency of computer use as the most significant predictor of self-efficacy for preservice education students.

Highlighting the relationship between self-efficacy and actual computer use, Sime and Priestley (2005) found “that confidence in ICT use is important, but that it is to some extent underpinned by competence” (p. 141). Based on his empirical findings, that stress the importance of teachers’ beliefs, Yildirim (2000) recommends that “One way to encourage teachers to use computers in the classroom is to increase their level of competency” (p. 492). Confidence, or a belief in one’s own ability to use ICT, like other skills, it would seem derives from opportunity, exposure, and continued experience. It can be deduced that a logical way to satisfy such criteria would be by providing teachers with confidence (and competency) building professional development and training opportunities. After examining the impact of an educational technology program on educators, Gonzales, Pickett, Hupert, and Martin (2002) noted that “Confidence creates opportunities for personal growth and career advancement for teachers, and a belief in their own competency can help teachers feel more comfortable experimenting with new software and technology enhanced curricula” (p. 15). Thus, it should not be a stretch to suggest that beliefs, shaped at least in part by skill training, represent an important factor

in the adoption and integration of ICT. Reflecting specifically on Initial Teacher Education (ITE) programs, Sime and Priestley (2005) suggest that preservice teachers,

like teachers, often express their lack of confidence in their ICT skills and this implicitly affects their attitudes towards the use of ICT in their teaching. Although many ITE programmes provide appropriate support for students to develop their skills, it is important that the development of ICT pedagogies are underpinned by a reasonable level of generic IT skills. Lack of such skills may generate ICT-phobia and lead to negative ideas about the relevance of ICT as a tool for learning (p. 141).

Teacher training is viewed as an avenue by which competencies can be acquired, and also an avenue by which confidence (a belief in those competencies, or belief in oneself) can be fostered.

Preservice Teacher Education

Thus far, it has been suggested that two interrelated factors are paramount to determining the success of ICT integration: (1) teachers' beliefs (2) teachers' professional development. Nowhere perhaps is the intersection of these two factors more significant than in preservice teacher education programs, which have the responsibility for training future teachers. Wang (2002) contends that

Preservice teachers' beliefs and perceptions play a crucial role in shaping their future teaching behaviors. Understanding preservice teachers' beliefs will help improve their professional preparation ... With computers becoming an essential part of the learning process in classroom settings, it is imperative to investigate preservice teachers' perceptions of their roles as teachers in such a learning environment (p. 152).

As highlighted in the previous section, research suggests that teacher beliefs about teaching and attitudes toward technology influence the successful adoption of ICT in their classrooms.

Preservice Teachers' Beliefs

The beliefs of preservice teachers are hard to change, as many preservice teachers

enter professional education programs with preconceived notions about teaching based on their years in school as students (Pajares, 1992). This is to say that years of schooling result in the formation of deeply ingrained beliefs, and that these beliefs are likely very difficult to change in a teacher education program. Research has shown that it would be presumptuous to assume that just because preservice teachers have grown up in the information age they will be prepared to integrate technology into their own classrooms (Schrum et al., 2003). It follows that if future teachers were not exposed to appropriate educational uses of ICTs during their own K-12 school experiences, then they may not be inclined to integrate ICTs into their own pedagogical practices. Pajares (1992) refers to this as the “resistant-to-change nature of educational beliefs” (p. 324). In general, education is slow to change because the beliefs and philosophies of new teachers often reflect those who taught them. Wang (2002) supports this notion, suggesting:

Preservice teachers’ perceptions of the teacher’s role are grounded in their beliefs about teaching and learning in general ... Preservice teachers’ beliefs about teaching and learning are primarily the results of their personal experience as students in the learning process (pp. 156-157).

The concern is that the preconceived notions about ICT held by the current generation of preservice teachers may look a lot like those held by the generation of teachers that came before it. Yildirim (2000) asserts that “Teachers teach as they have been taught, and it is unlikely that computer skills will be transferred to students and encouraged by teachers unless the teachers have positive attitudes toward computer use” (p. 481).

Recognizing that ICT adoption requires careful development and promotion of appropriate attitudes and beliefs, Milbrath and Kinzie (2000) suggest “it is essential to provide teachers with adequate computer training early in the education process” (p. 376). Since it is not possible to change the past K-12 experiences of prospective teachers, preservice education seems like a particularly appropriate time to begin fostering positive

attitudes and beliefs towards ICT integration. Kay (2006) suggests that “preservice teacher education programs are a natural place to start with respect to integrating technology into education, particularly when there exists a strong infrastructure that supports computer use” (p. 384). Research has shown us that in order for ICTs to be used effectively in our classrooms, we need teachers who have positive computer attitudes and feel self-efficacious in using the technologies that exist (Milbrath & Kinzie, 2000). Thus, adequately preparing new teachers to incorporate ICT into their pedagogy, it would seem, should involve fostering appropriate attitudes and beliefs toward educational technology.

Educating the Educators

The emerging reality is that the ICTs that have been placed into K-12 schools are being underused (Cuban, 2001), and as Doering et al. (2003) state, “Teacher preparation programs may be part of the problem” (p. 342). Doering et al. (2003) assert that “A history of research reports indicate that preservice teachers are not being adequately prepared in educational technologies” (p. 342). Indeed, the literature suggests that despite attempts to prepare new teachers to adopt ICT, they are often hesitant to use ICT and do not feel capable of integrating it into their lessons (Moursund & Bielefeldt, 1999; Yildirim, 2000).

Moursund and Bielefeldt (1999) evaluated the results of a national survey in the United States regarding information technology integration in teacher education. Based on their findings, they made recommendations to teacher education programs that included (a) integrating ICT across all courses rather than a single course, (b) modeling of ICT integration by faculty, and (c) more opportunities to apply ICT during field experiences. Research literature in the years following that report indicated that teacher preparation programs had started to make changes, although the results of these changes

remained somewhat unclear. Kay (2006) reports that “Numerous teacher education programs have made extensive efforts to implement effective and meaningful use of technology, however the strategies used to attain these goals are complex, diverse, often conflicting, and rarely evaluated well” (pp. 384-385). A review of the literature suggests that there are several strategies used by teacher education programs to prepare preservice teachers to use technology. This includes (a) the use of a single educational technology course, (b) making efforts to infuse technology into all preservice courses, and (c) encouraging field-based experiences.

Single Technology Course

One of the most common ways of preparing preservice teachers to use ICTs is through a single technology course (Duhaney, 2001; Hargrave & Hsu, 2000; Moursund & Bielefeldt, 1999). Hargrave and Hsu (2000) note, “Although not the only model, the single course appears to be the dominant model for technology preparation of preservice teachers” (p. 313). While it has been suggested that the stand-alone course approach may be effective at improving the self-efficacy of preservice teachers (Gunter, 2001), other research has shown this strategy may not translate into technology integration in K-12 classrooms (Belson & Larkin, 2004; Bosch & Cardinale, 1993; Schrum, 1999, Strudler et al., 1999). Moursund and Bielefeldt (1999) concluded that the most important finding of the *National Survey on Information Technology in Teacher Education* was “that formal stand-alone IT coursework does not correlate well with scores on items dealing with technology skills and the ability to integrate IT into teaching” (p. 3). Belson and Larkin (2004), criticize the stand-alone course approach, suggesting that it gives “students the impression that they too can simply ‘add-on’ technology when they are teaching and not use it throughout their lessons” (p. 22). However, Hargrave and Hsu (2000), suggest that

there are signs for optimism, as stand-alone courses are starting to place “growing emphasis on curriculum integration of technology in contrast to the use of technology for personal use or teacher productivity” (p. 313). This shift is consistent with a larger paradigm transition that focuses on preparing teachers to use technology by way of integration and infusion. There seems to be a consensus among researchers that teacher preparation programs need to go beyond offering a single course approach (Bosch & Cardinale, 1993; Moursund & Bielefeldt, 1999; Schrum, 1999, Strudler et al., 1999).

Infusing Technology into all Preservice Courses

A recent review of the literature by Kay (2006) revealed a relatively high percentage of research articles focusing on an integrated approach as a strategy for teaching technology to preservice teachers. This integrated strategy involves the use of technology in all preservice education courses, rather than just a single course that teaches basic computer skills. According to Belson and Larkin (2004), this strategy is more desirable than a stand-alone course because students “have more opportunities to practice a variety of technologies in a more realistic context” (p. 22). Research suggests that having faculty and instructors model the effective use of technology in preservice courses may be beneficial in preparing future K-12 teachers to do the same (Moursund & Bielefeldt, 1999; Handler, 1993; Schrum, 1999; Strudler et al., 1999). In this sense, technology would be infused throughout the teacher preparation program as a means of modeling and demonstrating its value and benefits. However, as Stetson and Bagwell (1999) point out, teacher educators are experiencing the same challenges as K-12 educators in technology integration. In order for the integration and infusion approach to work, teacher preparation programs need to begin by developing and implementing a long-range plan for technology (Stetson & Bagwell, 1999), as well as establish training to

help faculty members integrate technology (Duhaney, 2001). Building further on the notion of integration, after conducting a survey that investigated the needs and concerns of first-year teachers, Strudler et al. (1999) concluded that

While exposure to educational computing and technology in coursework lays a much needed foundation, integration of technology into field experiences is arguably the most critical need for preparing graduates to use technology—and clearly, it is the most sorely lacking (p. 124).

Thus, it would seem that integrating ICT into field-based experiences needs to become a priority for preservice programs. As the following subsection demonstrates, other studies support this notion, while also pointing toward a need for more research.

Field-based Technology Experiences

Although research concerned with the role of the field-based practicum in technology integration is limited, there is evidence that suggests this component of teacher education is vitally important. Research conducted by Handler (1993), which involved a survey of 133 education graduates, revealed that observing associate teachers effectively integrating technology helped to prepare new teachers to integrate it. Downes's (1993) investigation into preservice teachers' uses of computers during practicum sessions, found that the mentor teachers' modeling of technology integration was a significant factor. In Downes's study, the preservice teachers who received support from their mentor teachers, in the form of positive role modeling of technology integration, were more likely to integrate technology themselves. The concern is that many preservice teachers may not be receiving this support. In a study conducted by Bosch and Cardinale (1993), involving a survey of 186 preservice teachers over three semesters, it was revealed that the preservice teachers neither observed computer use nor used computers as an instructional tool during their field placements. What was also apparent from the data was "that the preservice teachers saw little if any modeling of

computer use during field experiences” (Bosch & Cardinale, 1993, p. 26). According to Moursund and Bielefeldt (1999),

Most institutions report that IT [Information Technology] is available in the K-12 classrooms where student teachers get their field experience; however, most student teachers do not routinely use technology during field experience and do not work under master teachers and supervisors who can advise them on IT use (p. 21).

While this observation was made almost a decade ago, my anecdotal questioning of preservice teachers suggests that things may not have changed since then (see *Personal Ground* in Chapter 1). Although one would expect that such findings would cause concern, and give rise to extensive studies concerning ICT integration and field-based placements, this does not seem to be the case. A recent literature review conducted by Kay (2006), that investigated teacher preparation programs’ approaches to ICT, revealed that research focusing on students’ practice in the field was significantly underrepresented. The current thesis project addresses this research gap by making the preservice field-based practicum a focal point for empirical inquiry.

It is possible that field-based practicum experiences may be instrumental in developing preservice teachers’ beliefs regarding ICT. Doering et al. (2003), in their qualitative case study of ten preservice teachers, revealed that participants who felt support from their mentor teacher also expressed greater confidence in their own use of technology within the classroom. In Doering et al.’s study, mentor teachers were found to have “played a major role in the preservice teachers’ perceived success of technology integration” (p. 352). Four of the ten participants reported that their mentor teacher did not always support technology integration, and in some situations, “integrating technology became so difficult that the participants gave up trying” (Doering et al., 2003, p. 352).

In light of research that indicates preservice teachers are very active in developing

their beliefs about the implementation of ICT in schools (Sime & Prestley, 2005), this notion of preservice teachers ‘giving up’ on ICT integration during their initial classroom experiences is particularly concerning. It is conceivable that negative practicum experiences may result in preservice teachers forming negative beliefs and perceptions regarding the educational use of ICT. Underscoring this concern, Wang (2002) points to preservice teachers’ beliefs and perceptions as playing “a crucial role in shaping their future teaching behaviors” (p. 152). Likewise, Sime & Priestly (2005) assert that “Positive attitudes to the role of ICT in teaching are crucial in influencing teachers’ decisions to use technologies in their teaching” (p. 140).

Placing Beliefs and Field-based Experiences in Context

Recognizing the importance of field-based placements, recent studies have begun to look at the role of technology-mentoring (Grove, Odell & Strudler, 2006; Grove, Strudler & Odell, 2004). Mentor teachers are undoubtedly an important factor in the development of preservice teachers’ beliefs concerning the educational use ICT, but are not necessarily the definitive factor. If previous research has shown anything, it is that there are a range of factors that need to be considered when examining the formation of beliefs and perceptions. While the role mentor teachers play in influencing preservice teachers’ beliefs regarding ICT are important, it is imperative to realize that mentor teachers constitute only a single element or dimension of the practicum experience. It would be naïve to assume that during placements preservice teachers simply acquire or mimic the ICT-related beliefs held by mentor teachers. The current research views preservice teachers as intelligent people who actively seek to make sense of their practicum experiences, and who form beliefs based on their own histories and perspectives.

Appropriately, Sime and Priestly (2005) characterize the development of attitudes during teacher training as being a “dynamic process” (p. 140). During initial teacher training, preservice teachers’ existing beliefs and hypotheses about the uses of ICT are challenged on a regular basis as a result of various new experiences (Sime & Priestly, 2005). Drawing on the knowledge conveyed by previous research, this thesis will acknowledge the practicum placement as an essential part of that process. At the same time, this research recognizes that the practicum placement does not act in isolation to influence preservice teachers’ beliefs about ICT. Thus, while focusing on the role of the field-based practicum in shaping preservice teachers’ perceptions regarding ICT, the research will aim to position these perspectives within the context of the individuals’ unique life experiences and existing or shifting beliefs. In doing so, it will seek a more holistic understanding of the dynamic process by which new teachers come to perceive the educational use of ICT.

Summary

It seems apparent that teacher preparation programs have a mandate and responsibility to encourage preservice teachers to explore the use of ICT. If we are to fully and effectively integrate ICT into K-12 classrooms, teacher preparation programs need to play a critical role. Previous research findings hint at the notion that field-based practicum experiences may be a particularly important avenue through which that objective can be approached. Given the trend toward “information age” equipped schools, and the recognition that teachers’ beliefs are critical to effective ICT integration, one would hope that practicum experiences are helping preservice teachers cultivate positive and self-efficacious feelings toward ICT. Despite the claim that the integration of technology into field experiences could be the most critical aspect of preparing new

teachers to use technology (Strudler et al., 1999), little is actually known about the role field-based experiences play in shaping new teachers' beliefs and intentions regarding ICT. Given that field-based practicum placements are characteristic of most initial teacher education programs, an investigation into this facet of teacher preparation seems warranted.

Studies have begun to look at the influence of technology-mentoring during field-based experiences. However, by taking that specific focus, they fail to consider all the dimensions involved in the dynamic process by which preservice teachers formulate their beliefs. This research, which was exploratory in nature, aims to fill this research gap by providing a holistic approach toward understanding the relationship between preservice teachers' field-based experiences and their ICT-related beliefs. The beliefs that preservice teachers communicated during their field-based placements were contextualized within a framework of experience that extended beyond the field-based placement itself. The following chapter outlines the methodology that helped facilitate this research.

CHAPTER 3

Methodology and Methods

This research explored four preservice teachers' field-based experiences and their ICT-related beliefs. The aim was to understand the preservice teachers' perceptions of the use of ICT in the classroom through an examination of narratives that they provide, wherein the interaction of their beliefs and experiences is revealed. By exposing their previously untold stories, this research aimed to foster an "enlightened eye" (Eisner, 1991). This is to say that the research aimed not only to provide a mechanism by which the views of participants could be exposed, but it also aimed to promote a level of understanding previously missing from the literature. Specifically, it intended to reveal a holistic understanding of the role that the field-based practicum plays in shaping preservice teachers' perceptions of the educational use of ICT.

A qualitative study, because of its naturalistic and interpretative approach, was selected as a means of advancing understanding of preservice teachers' perceptions and experiences. Researchers using qualitative techniques "study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them" (Denzin & Lincoln, 2000, p. 3). According to Merriam (1988), the objective of the qualitative approach is "to understand the meaning of an experience" (p. 16). The capacity to explicate meaning from experience was congruent with the intent of the present research project, which was to contextualize the interaction of beliefs and experiences, and in doing so uncover the significance of the field-based placement. That is, the qualitative approach suited the goal of revealing, and making available for analysis, preservice teachers' perceptions of ICT that arise from field-based experience. Given the emergent nature of qualitative research, the design evolved through

the course of the research.

Research Design

Narrative inquiry informed the qualitative research methodology of this research. Narrative inquiry, according to Cresswell (2007, p. 54) “begins with the experiences as expressed in lived and told stories of individuals.” This approach provides researchers with the ability to tap into the wealth of knowledge that inhabits the stories that people tell about their lives and their experience. Using narrative inquiry, researchers can “explore an educational research problem by understanding the experiences of an individual” (Creswell, 2005, p. 477). The attractiveness of narrative in contemporary research on teaching and teacher education, according to Carter (1993), “is grounded in the notion that story represents a way of knowing and thinking that is particularly suited to explicating the issues with which we deal” (p. 6). Likewise, Connelly and Clandinin (1990) suggest that narrative research is an asset to studies of educational practice, because teachers, like all other human beings, are storytellers who lead storied lives. As educational experiences occur as narrative, it follows that they should be investigated through narrative (Clandinin & Connelly, 2000).

According to Carter (1993), stories are valuable because they capture “in a special fashion the richness and the nuances of meaning in human affairs” (p. 6). Moen (2006) aptly points out that creating “a narrative is primarily a process that organizes human experiences into meaningful episodes” (p. 6). It is through stories and narrative that we make sense of the events and experiences that shape human lives. Narrative inquiry enables researchers to investigate how humans make meaning of their experiences (Connelly & Clandinin, 1990). Thus, the narrative approach provides an opportunity to

understand the meaning of a phenomenon from the perspective of those who experience it. According to Creswell (2005), it affords the researcher opportunities to explore an “individual’s past, present, and future experiences lodged within specific settings or contexts” (p. 477). It was the intention of the research to investigate preservice teachers’ perspectives of ICT as they engage in practicum experiences. The narrative approach presented a fitting means for accessing, interpreting and understanding participants’ perceptions.

This research incorporated multiple cases, as per a collective case study (Stake, 2000), as a strategy for obtaining multiple and varied narratives. This type of study can also be referred to as a multiple case study. The case study technique was used because of its ability to produce rich and holistic accounts and understandings of phenomena based on real life situations (Merriam, 1988). Case studies are useful when the researcher wants to explore contextual conditions that might be highly pertinent to the phenomenon under study (Yin, 2003).

A case study is an investigation into a bounded system defined by an activity, event, process, or individuals (Creswell, 2005). For this research, it was a detailed investigation into the perspectives of four individuals, all Bachelor of Education students at Lakehead University, who were each engaging in their first field-based practicum. The thesis sought to reveal the perceptions of these preservice teachers by exploring their narrative accounts of the field-based practicum.

The researcher deemed it appropriate to include multiple participants as a means of forming a rich data set from which significant insights and conclusions could be drawn. In comparison to a study that only employs a single case, it is “considered more

compelling, and the overall study is therefore regarded as more robust" (Yin, 2003, p. 46). It can be expected with such a study that each participant will have a unique story that may conflict with or be supportive of the narratives expressed by the others (Creswell, 2005). The four cases were described, compared and contrasted to provide insight into issues of significance. Stake (2000) suggests that although individual cases can turn out to be alike or un-alike, both redundancy and variety in what is found can be revealing (Stake, 2000). As a collective, the voices of the participants have the potential to resonate central and emergent themes.

This research made use of narrative inquiry within a collective case study design to elucidate the meaning and significance of preservice teachers' experiences, and begin to understand the beliefs that influence their actions and intentions concerning ICT.

Narratives are of particular value to this research because they "take into account not only current practices and situations but the past lives and experiences of teachers, and their future aspirations" (Geelan, 2003, p. 67). Narrative inquiry offered a way to penetrate participants' socially constructed realities and beliefs, and shed light on the rich and complex interactions that embody their ICT related experiences. This approach provided for a nuanced understanding of participants' field-based experiences with ICT, and helped connect the meaning of those experiences to broader contextual factors.

Narrative inquiry is useful as it enables the researcher to interpret the meanings others have about the world and, rather than starting with a theory, to develop a pattern of meaning from the perspectives of others (Creswell, 2003). In other words, the design emphasizes the importance of learning from the participants (Creswell, 2005). As it has done for current thesis, a literature review can provide a rationale for investigating a

certain type of case, and even provide a sense of what one might expect to find. However, no matter how comprehensive it may be, a literature review cannot represent the significance of narratives that have yet to be told. Prior to considering the voice of the participants, the researcher cannot know for certain “what the issues, the perceptions, the theory will be” (Stake, 2000, p. 441). This knowledge needs to be discovered through a process of in-depth inquiry, description, and analysis.

Setting and Situational Context

All of the participants in this research project were students (preservice teachers) enrolled in the 2007/2008 one year Bachelor of Education program at Lakehead University’s Faculty of Education in Thunder Bay, Ontario. This is a consecutive program, meaning it is a program of teacher education that follows the completion of an undergraduate degree. In accordance with admissions requirements, students in the program come from a variety of educational backgrounds, but all possess at least one undergraduate degree. Successful graduates of Lakehead University’s Bachelor of Education program, like graduates of other professional teacher education programs in Ontario, are recommended to the Ontario College of Teachers for provincial teaching certification.

The Bachelor of Education program consists of two terms of courses supported by two practical placements. The first term of the 2007/2008 program began September 6, 2007 and ended with a twenty-five day field-based placement that ran from November 12, 2007 to December 14, 2007. The second, and final term, began January 7, 2008 and concluded with a second twenty-five day field-based practicum that took place between March 17, 2008 and April 22, 2008.

Since the focus of this research was on the first field-based practicum, data collection coincided with first placement period. Although this research made use of the Bachelor of Education program as a basis for research, the study itself operated independently of the requirements and expectations of the program. This is to say that the study operated congruently with the activities of the professional program, but played no role in academic or administrative decisions regarding student assessment or achievement. Participation in this research was completely voluntary, and in no way influenced course or placement assessment.

All of the participants in this research were in the Junior/Intermediate (J/I) teaching track, meaning that they were seeking certification to teach Grade 4 through to Grade 10. Preservice teachers in the J/I track take a common set of compulsory education courses, with the exception of one “teachable subject” course, and one elective. A student’s “teachable subject” is usually determined by the focus of previous undergraduate credits. In total, there are twelve teachable subjects: English, General Science, History, Visual Arts, Music, Physical & Health Education, Geography, French, Indigenous Learning, Mathematics, Native Languages, or Computer Science. The participants in this research had a variety of educational backgrounds and teachable subjects, but all possessed at least one undergraduate degree prior to entering to program.

Participant Selection

A researcher’s ability to thoroughly investigate and adequately understand the phenomenon of interest depends heavily on the appropriate selection of each case (Patton, 2002; Yin, 2003). Stake (2000) emphasizes that in this type of research, “nothing is more important than making a proper selection of cases” (p. 446). Well-selected cases

represent opportunities for meaningful inquiry. Thus, this qualitative study employed purposeful sampling as a means of ensuring appropriate participants were selected. In purposeful sampling, a researcher intentionally selects individuals and sites that offer insight into the central phenomenon being considered (Creswell, 2005). This is a type of sampling that “focuses on selecting information-rich cases whose study will illuminate the questions under study” (Patton, 2002, p. 230). Three complementary purposeful sampling techniques were used to select four preservice teachers as the research participants: typical site sampling, homogeneous sampling, and convenience sampling.

According to Patton (2002), information-rich qualitative sampling should aim to identify a minimum sample size “based on expected reasonable coverage of the phenomenon” (Patton, 2002, p. 246). Given that this qualitative study aimed to explore preservice teachers’ narratives in rich detail, a small sample was deemed appropriate. Given the nature of narrative inquiry, it was projected that a sample size of four preservice teachers would be adequate for attaining data saturation. Creswell (2007, p. 55) notes that “Narrative research is best for capturing the detailed stories or life experiences of a single life or the lives of a small number of individuals.” A sample size of four was small enough for all participants to have their voices represented, yet large enough to capture a range of voices and achieve data saturation. Given the nature of the research questions asked, and the sampling procedures that follow, the sample size was deemed reasonable for the purpose of undertaking an in-depth and case-oriented analysis.

As mentioned previously, all participants in this research project were students enrolled in a professional teacher education program at Lakehead University. Typical site sampling (Patton, 2002) served as a basis for selecting Lakehead University as a site from

which participants could be recruited. In accordance with typical site sampling, “the site is specifically selected because it is not in any major way atypical, extreme, deviant, or intensely unusual” (Patton, 2002, p. 236). This is to suggest that Lakehead University’s one-year Bachelor of Education program can be viewed as representative or typical of the same degree program at other universities. As a result of operating within a common fiscal and regulatory framework, teacher education programs in Ontario’s universities share similar attributes. Ministry regulations dictate a great deal of the content and format of consecutive teacher education programs, and the Ontario College of Teachers (OCT) oversees all program accreditation. Particularly noteworthy is the fact that provincial standards require all accredited teacher education programs to include field-based placements. As a representative or typical example, Lakehead University’s consecutive teacher education program allows for a commonplace understanding of the general process of teacher education in Ontario. Thus, it seemed reasonable that a sample selected exclusively from this one program, although not definitive, could be illustrative. Examination of such a sample has potential to elucidate key issues that may be relevant to any teacher education program that makes use of field-based placements.

In order to identify a group of potential participants, a homogeneous sampling strategy was utilized. Homogeneous sampling provides an opportunity to capture and describe themes that are central to the experiences of a particular subgroup (Patton, 2002). When using this strategy, the researcher purposefully selects participants “based on membership in a subgroup that has defining characteristics” (Creswell, 2005, p. 206). In order to be considered for this research, preservice teachers had to (a) be enrolled in the one-year Bachelor of Education program at Lakehead University, and (b) be in the

Junior/Intermediate (J/I) track of the teacher education program.

This delimiting approach was intended to reduce variation in the nature of the participants' field-based placements, which were assigned by the placement office according to teaching track. This criterion ensured that only individuals assigned to field-based placements in elementary schools, and in classrooms ranging from Grades 4-8, would be considered as potential participants. Following ethical approval, permission was sought from the office of Undergraduate Studies in Education to have a recruitment poster sent via email to all students in the one-year Bachelor of Education program (see Appendix A for the "Permission to Recruit" letter and the accompanying consent form). This recruitment poster (see Appendix B) explained the nature and purpose of the research, and invited interested J/I preservice teachers to contact the researcher. Permission was also sought to place a printed copy of this poster on a prominent campus bulletin board. All communication between potential participants and the researcher was kept confidential.

Finally, convenience sampling was used to select participants from the group of individuals identified as potential participants. The researcher met privately with interested individuals to explain the research and answered any questions. From the pool of interested preservice teachers, four participants were selected based upon their eligibility and willingness to participate in the research.

In recognition of the fact that there is no such thing as a typical or archetype preservice teacher, a diverse sample was deemed particularly desirable. The acquisition of a diverse sample was viewed as a means of engendering transferability within the research. In other words, it was thought that a diverse sample would enhance the

applicability of the findings to other contexts. It was decided that by maximizing variation in the information-rich sample, the research would ultimately permit the reader more opportunities to infer similarities between their particular situation and the situations illustrated in the individual cases. Toward this end, participants representing different academic backgrounds, gender, and age groups were sought.

By way of the process outlined above, four participants were successfully recruited for this research project. This sample included three male participants and one female participant. The participants ranged in age from 25 years to 47 years, and possessed diverse backgrounds, experiences and beliefs.

Data Collection

Consistent with principles of narrative research, the data for this inquiry was obtained from multiple data sources. Following the advice of Creswell (2007), subsequent to selecting suitable participants, this research focused on “gathering their stories through multiple types of information” (p. 55). Given this intention, an eclectic and complementary combination of data sources seemed appropriate. Creswell (2005) refers to these sources of information as “field texts.” In an attempt to obtain rich and textured field texts, this research made use of three types of narrative data: participant biographical questionnaire responses, participant journal entries, and participant interview transcriptions. What follows is a description of the collection techniques and procedures that were used to acquire these three separate sources of field text.

Preliminary Participant Questionnaire

After considering the letter of introduction and signing the consent form (see Appendix C), each participant was asked to complete a preliminary questionnaire (see

Appendix D). This questionnaire solicited information that was used to verify that potential participants met the sampling criteria. The questionnaire, which is primarily biographical in nature, was designed to obtain individual teacher characteristics, and includes the following information: age, gender, education background, subject area, and computer ownership. Participants were also asked to provide self-reports concerning their individual aptitude, anxiety, and attitudes toward the use of ICT in the classroom.

Additionally, it was requested that participants provide a 2-3 page narrative account that highlighted their previous experience with or exposure to ICT. To guide this account, participants were asked “What past experiences have influenced how you currently perceive the use of ICT in schools?” As further guidance, participants were prompted to reflect on (a) experiences with ICT as a K-12 student, (b) experiences with ICT as an undergraduate student, (c) experiences with ICT during their teacher education program, or (d) experiences with ICT in their personal lives. Participants were encouraged to seek the researcher’s help if they need further clarification. They each had one week to complete the questionnaire form, and were instructed to return it directly to the researcher at a prearranged time prior to commencement of the practicum. Ultimately, the information derived from this preliminary questionnaire was useful in corroborating, analyzing, interpreting and contextualizing the narrative data gained in subsequent journal entries and interviews.

Weekly Journal Entries

The second source of data for this research was weekly journal entries made by participants during their field-based practicum. Journals made by participants in practical settings can contribute to rich narrative data (Connelly & Clandinin, 1990). Journaling,

also known as diary writing, is a flexible and useful research technique (Alaszewski, 2006), in which participants make record of their thoughts and experiences relevant to the research question. A diary is “defined as a document created by an individual who has maintained a regular, personal and contemporaneous record” (Alaszewski, 2006, p. 1). Each diary (or journal) entry gives an account of “what an individual considers relevant and important and may include events, activities, interactions, impressions and feelings” (Alaszewski, 2006, p. 2).

Journaling was selected for this research as it offered a way to gain an understanding of real-life experiences from the perspective of the participants involved. In the journal entries, the participants were asked to record and reflect on their experiences concerning the use of ICT during their placement. The completed journals documented narratives, helped ground the discussion in the participating preservice teachers’ personal experiences, and served to complement the questionnaire and interview data.

Each participant was expected to make one journal entry at the end of each week. This resulted in a total of five entries per participant. To ensure their involvement in the research did not interfere with their classroom responsibilities, participants were asked to complete the journal entries at home and outside their regular classroom hours. They were encouraged to write freely and openly about their experiences and beliefs as they were assured anonymity. In their journals, participants were asked to record narrative accounts of instances in which ICT was used during their field-based placement. To guide their writing, participants were asked:

(1) Did you attempt to integrate ICT during your placement this week? How?

- (2) How did you see ICT being used during your placement this week?
- (3) What are your thoughts, feelings, and perceptions toward the above experiences?

Each participant was provided with a paper booklet that included a journal entry guide (see Appendix E) and space for five separate journal entries. Furthermore, participants were given the option to complete their entries electronically using a word processor. Participants were asked to write a minimum of one page and maximum of five pages of reflections each week. All of the participants opted to complete their entries using a word processor.

In-depth Participant Interviews

Interviewing is a particularly useful collection technique for students that are interested in participants' feelings, perceptions, and interpretations of events (Merriam, 1998). As such, this technique was able to make a significant contribution to the research. In-depth interviews served as the main source of narrative data. In-depth interviewing involved asking questions, listening to answers, and then posing additional questions to clarify or expand on emergent issues or themes. This approach enabled the researcher to probe the deeply seated contextual factors that influenced preservice teachers' beliefs, experiences and the perceptions that they developed, during their field-based practicum. Questions were asked about their experiences with ICT during their practicum, as well as about aspects of their lives that shaped their perceptions of those experiences.

Consistent with narrative inquiry, participants were encouraged to tell stories in response to the questions. Noting that everyday conversations often involve the telling of stories, Mishler (1986) suggests that interviewees will respond "with narratives if they are given some room to speak" (p. 69). According to Mishler (1986), "We are more likely

to find stories reported in studies using relatively unstructured interviews where respondents are invited to speak in their own voices, allowed to control the introduction and flow of topics, and encouraged to extend their responses” (p. 69). Following this guidance, a semi-structured interview format, that provided considerable flexibility, was deemed most appropriate for this research. Thus, questions were open-ended and designed to elicit detailed stories.

The interviews were considered semi-structured as an interview guide was employed. The interview guide is set forth in Appendix F. The guide established some pre-determined questions that were considered essential to each interview, and served as a checklist to ensure a benchmark of information was obtained from each participant. Its purpose was to delimit, not limit, the issues to be taken up in the interview. The interviews were characterized as flexible, and remained fairly conversational. The researcher was free to pursue any area of inquiry which happened to emerge through genuine dialogue with the participant. In this sense, each interview resembled a guided conversation (Bogdan & Biklen, 2003). Although questions and responses were flexible in nature, each interview was guided by the overall purpose of the research. This is what Van Manen (1992, pp. 97-98) calls the phenomenological orientation of the interview, “a kind of conversational relation that the researcher develops with the notion he or she wishes to explore and understand.” In this view, the task of the researcher is to keep the questions open, but also “to keep himself or herself and the interviewee oriented to the substance of the thing being questioned” (Van Manen, 1992, p. 98). So although all interviews were exploratory and open-ended, they maintained a focus on exploring a specific phenomenon, namely the interaction of the participants’ beliefs and experiences

concerning the educational use of ICT and of the perceptions that developed from that interaction. Toward this end, the interview was used as an opportunity to have participants clarify and expand on information derived from their questionnaire responses and diary entries.

The goal of the interview process was to allow research participants to reflect upon the domain of discourse in a relatively free-flowing manner. As the interviewer, I aimed to create safe conversational contexts in which salient perceptions could emerge. Following completion of the field-based practicum, one interview was conducted with each participant. Each interview was scheduled for approximately one hour in duration, and was conducted face-to-face. The location of each interview was determined based upon mutual agreement between the researcher and the participant being interviewed. In accordance with the letter of introduction and consent form, see Appendix C, each interview was audio-recorded for later transcription.

Accuracy and Credibility

Throughout the process of data collection and analysis, it is critical that findings are both accurate and credible (Creswell, 2005). Towards that objective, this research project made use of two fundamental validation strategies: (1) triangulation and (2) member checking. These strategies are imperative to the notion of trustworthiness addressed in Chapter 1. In agreement with good methodological design, triangulation and member checking were implicit to the data collection and interpretation methods employed by this research. This is to say that accuracy and credibility were built into the design of the research.

Triangulation

The use of multiple qualitative approaches (questionnaire, journal, and interview), as it is outlined in the previous subsection, provides for a form of triangulation.

Triangulation takes place when a rich variety of methodological combinations are employed to elucidate an inquiry question (Patton, 2002). In short, it “strengthens a study by combining methods” (Patton, 2002, p. 247). The use of multiple qualitative methods to collect data from each participant strengthened this research by minimizing the limitations of self-reported data. This is because a participant’s questionnaire responses, journal entries, and interview responses provided an opportunity for what Patton (2002) calls “cross-data validity checks” (p. 248). The point was to test for consistency across different kinds of data within each individual’s case. As Patton (2002) notes, “Different kinds of data may yield somewhat different results because different types of inquiry are sensitive to different real-world nuances ... understanding inconsistencies in findings across different kinds of data can be illuminative” (p. 248).

The use of triangulation allowed the researcher to capture a more complete, holistic and contextual portrayal of each participant, with each data source contributing to a deeper understanding of experiences and perceptions. The notion here is that the sum of the whole is greater than its parts. Three sources of qualitative evidence are considered more compelling than one source of data. Triangulation is beneficial because it “provides more and better evidence from which researchers can *construct meaningful propositions* about the social world” (Mathison, 1988, p. 15, emphasis in original). This research utilized triangulation as a means of ensuring confirmation and completeness of the field texts. In turn, it ensured the existence of rich data for analysis, and ultimately serves to increase the overall trustworthiness of the research.

Member Checking

All interviews were audio-recorded, and later transcribed. Prior to being analyzed as data, the transcripts were returned to the participants for member checking. This “is a qualitative process during which the researcher asks one or more participants in the study to check the accuracy of the account” (Creswell, 2005, p. 594). This technique, which was continuous during the research, was employed as a means of ensuring accuracy and credibility. According to Lincoln and Guba (1985, p. 314), member checking is “the most crucial technique for establishing credibility.” As part of the member checking process, participants were given the opportunity to review their questionnaire responses and journal entries. They were free to retract, exclude, or edit any portion of their questionnaire responses or journal entries prior to surrendering them to the researcher. Furthermore, prior to analyzing data, the researcher requested that each participant review (and edit if necessary) the transcripts of their interview.

In order to assure that their voices were accurately represented by the researcher, the participants were also given the opportunity to member check their individual case-study vignettes. Only two of the four participants, William and John, pursued this final phase of the member checking process. In both cases, the requested changes involved only minor typographical amendments.

Data Analysis and Interpretation

The raw field texts acquired in the collection phase of the research represent “the undigested complexity of reality” (Patton, 2002, 463). The narratives of each participant embody the intricacies of their own experiences, but also the minutiae of schooling in general. As Geelan (2003) notes

The complexity of classroom contexts is not limited to the individual characteristics of the actors within the situation, or even to their social relationships with one another. Schooling also takes place within a set of relationships, practices and expectations around the issue of ‘how school is done’ (p. 2).

Simplifying and making sense of that complexity represents the challenge of data analysis (Patton, 2002). In this research, participants’ narratives were analyzed to reveal and make sense of the interaction between experiences *with* ICT and beliefs *about* ICT. Due to the qualitative nature of the field texts, an inductive approach to data analysis was utilized (Bogdan & Biklen, 2003). According to Bogdan and Biklen (2003), data analysis is a process of systematically searching and arranging the accumulated field data to enable the researcher to come up with findings. Narrative accounts were analyzed and interpreted to find and place the voice of the participants in context. In an attempt to get the most out of the narrative data, analysis occurred in two stages: within-case analysis and cross-case analysis (Merriam, 1998). As outlined below, the findings produced from these two stages are of particular value because of their transferability (Lincoln & Guba, 1985) and propensity for naturalistic generalization (Stake, 2000).

Within-case Analysis

Consistent with the within-case process outlined by Merriam (1998), each case was “first treated as a comprehensive case in and of itself” (p. 194). Although data for multiple cases had been collected, each case was initially analyzed independently. For each participant, the associated questionnaire, journal, and interview data was analyzed to develop an in-depth description of the case. Each individual represents an independent information-rich case (Merriam, 1998; Patton, 2002; Stake, 1995; Yin, 2003), the descriptions of each case have been individually and comprehensively presented in

Chapter 4. These descriptions depict each participant and provide an account of the experiences and beliefs that comprise his or her perceptions of the educational use of ICT. According to Patton (2002),

Each case study in a report stands alone, allowing the reader to understand the case as a unique, holistic entity. At a later point in analysis, it is possible to compare and contrast cases, but initially each case must be represented and understood as an idiosyncratic manifestation of the phenomenon of interest (p. 450).

To begin the within-case analysis, all field text associated with each participant were read carefully and thoroughly on a case-by-case basis. For each case, the researcher read the field texts as a whole, rather than question by question. This provided the researcher an opportunity to gain a holistic appreciation for the nature of each individual case. The field texts were then revisited case-by-case and hand-coded using a coding process adapted from the grounded-theory approach described by Glaser and Strauss (1967). In order to provide a focus for the analysis, '*beliefs about ICT*' and '*experiences with ICT*' were used as sensitizing concepts. These concepts, which were derived from the literature review, provided a basic framework for identifying elements in the data that were relevant to the primary research questions. In other words, the sensitizing concepts provided "starting points for building analysis" (Charmaz, 2000, p. 515). Guided by the sensitizing concepts, the researcher was able to recognize segments in the field texts that were significant to the research questions.

The object of the coding process was to make sense out of the data by identifying the segments with codes (Creswell, 2005). This process was undertaken as a way of organizing and integrating the field texts associated with each case. In essence, for each case, the coding process served to tie together the three sources of data that comprised its

field text (questionnaire, participant journaling, and interview). For each case, once the salient *beliefs* and *experiences* were identified in the field text, they were synthesized into a holistic, narrative portrayal of each participant. Thus, the product of the within-case analysis phase was not a list of beliefs and experiences, but four contextualized stories. Each story aimed to depict a participant's perceptions, and more specifically, the nature of the interaction between that participant's beliefs about ICT and their experiences with it.

The challenge was to skillfully craft each case so that it read "like a fine weaving" (Patton, 2002, p. 450). In light of that challenge, and considering the nature of the data, narrative analysis was embraced as a way of analyzing and representing each case. According to Polkinghorne (1995), narrative analysis involves the organization of "data elements into a coherent developmental account" (p. 15). In other words, narrative analysis is a procedure through which a researcher can generate stories. This approach entails "a synthesizing of the data rather than a separation of it into its constituent parts" (Polkinghorne, 1995, p. 15). Given that the current research endeavored to identify and elucidate beliefs held by the participants – something which "cannot be directly observed or measured but must be inferred from what people say, intend, and do" (Pajares, 1992, p. 314) – stories were deemed to be of particularly value.

Narrative analysis was employed as a means of producing explanatory stories that would convey the voices of the participants and communicate their relevant experiences and salient beliefs. Geelan (2003) suggests that narratives are valuable in educational research because they can "take into account not only current practices and situations but the past lives and experiences of teachers, and their future aspirations" (p. 67).

Underscoring this notion, is Polkinghorne's (1995) suggestion that

Narrative analysis relates events and actions to one another by configuring them as contributors to the advancement of a plot. The story constituted by narrative integration allows for the incorporation of the notions of human purpose and choice as well as chance happenings, dispositions, and environmental presses. The result of a narrative analysis is an explanation that is retrospective, having linked past events together to account for how a final outcome might have come about. In this analysis, the research attends to the temporal and unfolding dimension of human experience by organizing the events of the data along a before-after continuum (p. 16).

The strength of the narrative approach to the current research project rested in its ability to contextualize important situations within a discernible plot, reveal significant relationships, and ultimately render critical episodes and aspects comprehensible. Careful attention was given to presenting each case in a manner that would benefit from that strength. The outcome of the narrative analysis was the production of four individual 'case vignettes' (Patton, 2002, p. 451) or analytic narratives that depict the experiences and beliefs of each participant. Each case vignette was a readable, descriptive narrative about a person, "making accessible to the reader all the information necessary to understand the case in all its uniqueness" (Patton, 2002, p. 450). The intent was to generate stories that consisted of "events, characters and settings arranged in a temporal sequence implying both causality and significance" (Carter, 1993, p. 6).

Case vignettes are basically stories crafted by the researcher from the field data. According to Ely, Vinz, Anuzul, and Downing (1997), vignettes are narrative sketches "that carry within them an interpretation of the person, experience or situation that the writer describes" (p. 70). The vignette is described by Erickson (1986), as

a vivid portrayal of the conduct of an event of everyday life, in which the sights and sounds of what was being said and done are described in the natural sequence of their occurrence in real time. The moment-to-moment style of description in a narrative vignette gives the reader a sense of being there (pp. 149-150).

Thus, the production of case vignettes was congruent with Merriam's (1998) notion of 'within-case analysis,' as well as Polkinghorne's (1995) conception of 'narrative analysis.' Specifically, it allowed the beliefs communicated by participants during their field-based placements to be contextualized within a framework of experience that extended beyond the field-based placement itself. The experiences and beliefs depicted within the field data of each case were synthesized, by way of a plot line, into a vignette representing that particular case. The plot line of each vignette followed a storied account of an individual's ICT-related perceptions leading up to and through their field-based placement.

Given the temporal nature of the vignettes, an appreciation for how preservice teachers' practicum experiences interrelate with their past experiences and beliefs could be made apparent. Furthermore, this structure provided a platform on which participants' emerging perceptions and future intentions could be meaningfully represented. Perhaps most importantly, the within-case analysis allowed for in-depth, rich descriptions that facilitate transferability rather than broad generalizations. The four vignettes produced from the within-case narrative analysis are presented in Chapter 4.

Cross-case Analysis

According to Merriam (1998), a qualitative, inductive, multi-case study should seek "to build abstractions across cases" (p. 195). Once the individual within-case analysis had been completed, a cross-case analysis phase began (Merriam, 1998). Using the grounded theory approach, the cross-case analysis involved exploring similarities and differences among participants' stories. In this phase of analysis, the researcher attempted to build general explanations that fit each of the individual cases (Yin, 2003). The initial

approach included looking at whether a particular theme observed in one case was also observed in other cases.

This cross-case analysis resembled what Polkinghorne (1995) calls ‘analysis of narratives’ (p. 13). This is a paradigmatic analysis that “seeks to locate common themes or conceptual manifestations among the stories collected as data” (Polkinghorne, 1995, p. 13). It provides a method to uncover the commonalities that exist across cases, and “functions to generate general knowledge from a set of particular instances” (Polkinghorne, 1995, p. 14). Thus, the product of this stage of analysis was not a story, but a description of the themes that hold across the four cases. This was an inductive process, and the findings emerged from the rigorous review of data compiled during the preliminary within-case analyses. In essence, the cross-case analysis attempted to tie together the most significant narrative threads that comprise the collective case study. The findings and interpretations of the cross-case analysis are presented in Chapter 5 of this thesis.

Generalizations and Transferability

Related closely to the issue of interpreting narrative cases is the issue of moving from cases to general statements about education (Carter, 1993). As a qualitative study seeking to explore and describe four narrative cases, the interpretation phase was careful not to generalize results beyond the boundaries of those four cases. The cross-case analysis was central to the process of constructing generalizations, as it helped the researcher arrive at general statements that pertain to all four cases. These generalizations entailed “the careful framing of patterns with respect to certain themes” (Carter, 1993, p. 10). These patterns do not represent laws, but offer a basis for forming explanatory

propositions that can help explain the complexity of educational contexts (Carter, 1993). In Chapter 6, as a final phase of the exploratory investigation, the findings are positioned within the current literature and conclusions are drawn concerning their significance.

Although generalizations of the study's results are limited to the cases involved, this does not limit their value. This is because the attention to detail inherent in case studies makes them ideal for what Lincoln and Guba (1985) call transferability. Lincoln and Guba (1985) define transferability as whether or not the results can be useful or helpful in another situation. Transferability, in Lincoln and Guba's view, is associated with the degree to which a study employs thick description. That is, in order to have transferability, argues Geelan (2003), the researcher must provide an account of the

... context in which the study was conducted that is 'thick' (i.e. rich, responsive, detailed, thoughtful) *enough* that another investigator or practitioner can say 'that context is similar to my own in these ways, and different in these other ways, and on the balance of probability I judge that those findings will be useful for me in my context'. If the researcher's description of the context is too 'thin', the data required to make this kind of judgment will simply be absent from the research report, and its value for practitioners in different contexts will be vitiated simply because they cannot judge its relevance (p. 18, emphasis in original).

In this particular research, the context and the characteristics of the participants are described in sufficient detail to make transferability possible.

Attaining transferability is analogous to what Stake (2000, p. 442) calls 'naturalistic generalization'. This naturalistic approach is centered on a more intuitive, empirically-grounded form of generalization. His argument is based on the notion that reading a researcher's rich case account provides opportunity for vicarious experience and thus the construction of knowledge. He suggested that the results of case studies would often resonate with a broad cross section of readers, thereby facilitating a greater understanding of the phenomenon being studied. The readers of this collective case study

should be able, on the basis of the thick description it includes, to determine how the lessons learned from the research can be applied to other contexts.

The within-case analysis is intended to provide readers with vicarious experiences from which they can draw on their own naturalistic generalizations. The cross-case analysis, which is presented in Chapter 5, represents the researcher's naturalistic generalizations. These generalizations are based on the researcher's own opinions, understandings, abstractions and interpretations, informed by the voices of the four participants and relevant literature.

Ethical Considerations

This research involved four human participants; as a result an application to conduct this research was made to the Lakehead University Research Ethics Board. In accordance with the Tri-Council Policy Statement, prospective participants were not solicited until the application to conduct research had been approved by the Research Ethics Board. Following ethical approval, permission was sought from the office of Undergraduate Studies in Education to have a recruitment poster sent via email to all students in the one-year Bachelor of Education program (see Appendix A). The poster explained the nature and purpose of the research, and invited interested J/I preservice teachers to contact the researcher (see Appendix B). Permission was also sought to place a printed copy of this poster on a prominent campus bulletin board.

Prior to data collection, each participant was provided with a letter of introduction and an accompanying consent form (see Appendix C). This cover letter and consent form outline the purpose of the project, the voluntary nature of participants' involvement, and issues pertaining to confidentiality. Volunteers had to be aged 18 or older to be

considered as potential participants. Data collection did not commence until participant selection was complete and informed consent was obtained from each individual.

Participation in all phases of the research was voluntary, and each participant was informed in writing that they may withdraw from participation at any time. Every effort was made to ensure the confidentiality and anonymity of the participants and the schools at which they conducted their field-based practicum. Each participant selected their own pseudonym for use in the research.

It was the contention of the researcher, and the Thesis Committee, that due to the nature of this research, permission from the mentor teachers and administration of placement schools was not necessary. This was because the collection techniques employed did not require that the researcher gain access to the practicum sites, nor did it require interviews with the mentor teachers. The research focused only on the perceptions of the preservice teachers. Interviews were not conducted until after the five week practicum was complete. Furthermore, in order to ensure that the research did not interfere with the requirements of their teaching placements, the participants were instructed to complete the preliminary questionnaire and weekly journal entries away from the school and outside of school time.

Grade levels, class sizes, and other descriptive information (as reported by participants) are presented in this final report. However, as mentioned above, schools and the people involved in the practicum experiences are referred to by pseudonyms only. To further ensure the anonymity of people and institutions involved, the cities and school districts are not explicitly named in this report.

Although the research made use of the Bachelor of Education program as a basis

for research, the study itself operated independently of the requirements and expectations of the program. This is to say that the research operated congruently with the activities of the professional program, but played no role in academic or administrative decisions regarding student assessment or achievement. Some participants sampled were enrolled in Education 3210, a preservice course titled “Educational Technology in the Classroom”, for which the researcher served as a graduate assistant. This relationship did not represent a conflict of interest, as the researcher did not evaluate performance or issue marks to the preservice teachers participating in this research.

The research did not pose a threat to the health or well being of any of the participants. Respect, care, and understanding were accorded to all of the participants at all times. Answers to questionnaires and weekly journal entries have been, and will continue to be, kept in strict confidence. The interviews, as well as the audio recordings of the interviews were consensual.

Prior to being analyzed as data, transcripts were returned to the participants for member checking. This is a “is a qualitative process during which the researcher asks one or more participants in the study to check the accuracy of the account” (Creswell, 2005, p. 594). For this research, all participants were given the opportunity to revise or edit the transcripts of their interviews. In addition to member checking the interview transcripts, the participants were also free to retract, exclude, or edit any portion of their questionnaires responses or journal entries prior submitting them to the researcher for analyzing. Furthermore, the participants were given the opportunity to member check their final case-study vignettes in order to assure that their voices were accurately represented. In this final phase of validating the case vignettes, only two of the four participants requested minor alterations. In both instances the changes were simply

typographical.

The integrity of the data associated with this research was, and continues to be, a high priority. All data collected from this research study will be stored in a secure facility at Lakehead University for the duration of seven years. Following that time it will be destroyed appropriately. All actions involving this thesis project have conformed to the rules, regulations and procedural guidelines of the Faculty of Graduate Studies.

Timetable

It is important to note that due to the nature of the research, the data collection interval was largely dictated by the practicum placement schedule set by Lakehead University's Faculty of Education. For the 2007 academic term, the practicum placement period ran for twenty-five week-days between November and December.

Concluding Remarks

The current research made use of narrative inquiry within a collective case study design to elucidate the meaning and significance of preservice teachers' experiences concerning ICT. It was designed to shed light on the beliefs and perceptions that influence preservice teachers' actions and intentions regarding the integration of ICT into their practice. Narrative inquiry offered a way to penetrate perceptions of participants' realities and the rich and complex interactions that embody their ICT-related experiences. The collective case study strategy allowed for multiple and varied narratives that were deemed valuable. As described in the preceding sections of this chapter, the methodology was designed such that the research was feasible, credible, and ethical.

Having established the research design, Chapter 4 will present narratives accounts of the participants' experiences with ICT, as students themselves and as practicing

preservice teachers. The chapter begins with a brief introduction that articulates how the narrative vignettes were constructed and provides an explanation for including the vignettes as within-case research results.

CHAPTER 4

Within-Case Findings

This chapter represents the first part of the research findings. It comprises four cases – one for each preservice teacher who participated in the research – and presents a within-case analysis of each case. Each within-case analysis takes the form of an individual narrative analysis. The specific focus of the within-case analysis is to explore and reveal the interactions between the participants' educational beliefs about ICT and their field-based experiences with it.

According to Polkinghorne (1995), narrative analysis involves the organization of “data elements into a coherent developmental account [and] a synthesizing of the data rather than a separation of it into its constituent parts” (p. 15). Thus, the outcome of the within-case narrative analyses for this study was the production of four individual case vignettes. Narrative analysis was employed as a means of producing explanatory stories that would convey the voices of the participants and communicate their relevant experiences and salient beliefs. Each case vignette contextualizes each participant's beliefs within a framework of experience that extends beyond the field-based placement itself. The temporal nature of each vignette provides an appreciation for how preservice teachers' practicum experiences interrelate with their past experiences and beliefs is rendered apparent. Furthermore, the narrative format provides an avenue by which participants' emergent perceptions and future intentions can be articulated. Geelan (2003) suggests that narratives are valuable in educational research because they can “take into account not only current practices and situations but the past lives and experiences of teachers, and their future aspirations” (p. 67).

The four case vignettes are drawn from the field data and represent narrative

accounts of the ICT-related experiences and beliefs expressed by each of the four participants. These vignettes offer a glimpse into the participants' backgrounds and provide a window into their perceptions of ICT. The intention is to chronicle each participant's antecedent ICT experiences and elucidate the relationship between those experiences and the beliefs that emerged during the field-based placement. Within each vignette, each participant's experiences and beliefs are contextualized within a discernible plot which follows their storied (recollected) accounts of educational ICT-related perceptions leading up to and through the field-based placement. By causally linking prior happenings to latter effects (Polkinghorne, 1995), the plot conveys significant experiences and beliefs. Thus, this section provides an avenue for the participants' recollections and personal stories to be expressed, for significant relationships to be revealed, and for critical episodes to be rendered comprehensible to the reader.

The four vignettes are all presented in one chapter because collectively they can provide greater insight and understanding to the reader than any single vignette (Polkinghorne, 1995). Together, the four vignettes represent one body of data used to produce the cross-case analysis in Chapter 5. As discussed in Chapter 3, it is the researcher's contention that multiple vignettes offer more opportunities for naturalistic generalization and transferability. Ultimately, it is the responsibility of the reader to draw inferences from these findings and to determine if those inferences are relevant to other situations.

Where appropriate, quotations were taken verbatim from the field data (initial questionnaire, journal entries, and interview) associated with each case. Such quotations

permit the vignettes to capture the “voice” of the participants. Moreover, direct quotations of participants’ perspectives help achieve a high degree of verisimilitude, and enhance the credibility and authenticity of the findings. Apart from minor stylistic changes made for typographical reasons or readability, the quotations included in this chapter appear exactly as they do in the field data. Although quotations originate from at least one of the three forms of field data, in the interest of narrative lucidity, the researcher does not differentiate between the three sources when employing quotations.

The four participants profiled in the cases that follow each provided varying degrees of detail regarding their personal information, experiences, and beliefs. Thus, although each case is presented here as comprehensively as possible, some variation in detail does exist among the four cases. To ensure anonymity, participants are referred to by pseudonyms, and placement schools are not identified by name or location.

Case #1 – William

Everything has been trial and error

At the time of the study, William was a 30-year-old male. His undergraduate degree, obtained seven years previously from a large comprehensive university in Ontario, was in Geography and French. Following his undergraduate education, and prior to entering the Bachelor of Education program, William had worked in Japan teaching English as a Second Language (ESL). His teachable subject for the teacher education program was designated as Geography.

Foundational Experiences and Perceptions

Despite having grown up in a household that had acquired a variety of different computers, starting with a Commodore 64 in the 1980s, William characterizes his past experiences with ICT as having been “limited.” According to William, the ICTs he experienced during his youth “were used almost exclusively to play games on.” Furthermore, there had been very few opportunities to use computers at elementary school. His Grade 7 and Grade 8 classrooms had each contained a few computers, but these systems had been largely underused and “were kind of left in the corner.”

During the rare occasions when the computers had been used, the applications employed “were pretty simplistic.” For William, the value of having ICT in the classroom back then “was for students to familiarize themselves with a computer, from turning it on to maybe using a typing program.” William suspects that because his teachers had not grown up with computers “it was probably a little scary for them.” With the exception of “the occasional overhead and video” he could not recall ICT being integrated into any elementary school lessons.

By the time William entered high school in the early 1990s “the school was moving from typewriters to computers.” Despite the shift toward computers, William enrolled in only one computer oriented course during his studies. It was a Grade 11 information processing course that focused on teaching typing and word-processing skills. As he recalls it, that specific course had not been overly difficult, yet it resulted in him “feeling somewhat intimidated because I had this idea that computers were more difficult to use than I now realize them to be.” William ascribed his perceived lack of ICT use to his feeling of intimidation:

Perhaps that was why I made almost no effort to use the modern computer lab which was constructed during my grade twelve year. To some degree, I still feel this way [intimidated] and that has contributed to my desire to improve my knowledge and competence with ICT.

During his undergraduate university program William encountered ICT more frequently. For the first time during his education he was required to use computers to prepare reports and essays for all of his classes. He recalls “that some students and professors were starting to use MS PowerPoint for presentations and that the internet was becoming more popular as a source of information.” At that time, William had become curious about the ICT that was evermore commonplace, but still perceived it as being “complex and technical.” During his undergraduate program, he was hesitant towards completely embracing ICT, and recalls not using it for much more than basic word-processing and spreadsheet tasks.

It was William’s ESL teaching experience in Japan that first prompted him to consider the educational value of ICT. He recalled having been very impressed with a computer lab at one of the small schools at which he had taught ESL.

The school had ten very new computers with wireless internet throughout the

building. Each computer was connected to a main terminal, where the teacher could control the programs students were using and even see each of the ten individual computer screens. This allowed them to monitor students' activities and progress. There was also a large screen for projector presentations.

William recalled being “amazed to see this technology” being employed in a school:

I had spent more than twenty years as a student myself and had seen nothing even close to what this computer room had. It was a profound experience, one which made me realize that I needed to become more proficient using that kind of technology.

By the time William entered the Bachelor of Education program, he was using ICTs in his personal life “to some extent” on a regular basis. He was the owner of a laptop computer, and used it almost daily for searching the Internet, writing emails and preparing written documents. During the first semester of the preservice program he “had the opportunity to see ICT being used in lessons, from PowerPoint presentations and professors using web links in class to personally using video to make various projects and presentations.” William enrolled in the elective educational technology course during the first semester, and believed that as a result he had become “more interested in ICT.” He was “pretty impressed” with the ICT resources available to him at the university and felt like he had made progress with respect to using educational ICT. “Having the opportunity to see various types of ICT in lessons and using it resulted in a slight increase in confidence that I can use these technologies in the classroom.”

At the conclusion of the coursework component his first semester, William was expressing a keen interest toward the educational use of ICTs. “I believe it should be used in K-12 classrooms since it enables teachers to modify their teaching styles and strategies as well as allowing them to present information in an often more effective and interesting way,” he said. When asked of his intentions with respect to incorporating ICT into his

upcoming practicum, William replied, “As students [will] have access to the computer lab, I plan on using it. For example, students could visit websites on pulleys and gears which is part of the Grade 4 science curriculum.” Despite having already thought of some ideas for integrating ICT during his placement, William also expressed some uncertainty about his technical aptitude for using ICT. “Although my technical competence has somewhat improved, I still feel I need to spend more time to gain familiarity and proficiency,” he also acknowledged, while “I regularly use them to some extent, doing so often makes me anxious, especially when using them [ICTs] for something out of my zone of knowledge or comfort.” William suspected that he would be “able to prepare lessons that utilize various forms of ICT as long as the equipment is ready to go” and if all he was required to do was “switch a machine on or insert a USB card.”

The Field-based Practicum

For his first field-based practicum, William was placed in a K-6 school in a small Ontario city. There were 21 students in the Grade 4 class to which he was assigned. The classroom itself was located in a portable building detached from the main structure of the school. Initially, William was concerned about the availability of ICT resources in the portable. “I am uncertain as to how often I will be able to incorporate it [ICT], given the lack of technological resources in this particular classroom,” he offered. The classroom contained one computer, which was located on the teacher’s desk. Other ICT-related resources included a television with a DVD player and one “older style” overhead projector that used transparencies. The school library, which was part of the main school, included a computer lab with approximately 30 computers.

Week 1

In his first week of placement, William “Saw many different forms of ICT being used in the school and was able to incorporate it into one of my lessons.” William considered his mentor teacher’s use of the classroom television and DVD player as one significant way in which he saw ICT being used. He commented on this experience, by suggesting that:

It was apparent that most students are able to pay attention to information that comes from multi-media sources for longer periods of time than they are when simply listening to the teacher. They listen more carefully and can absorb information more efficiently. I suppose this is a result of hours spent watching TV and movies.

William soon realized that he would be expected to incorporate videos into this science lessons, as his mentor teacher had already ordered several videos in advance.

Furthermore, William’s mentor teacher also made it apparent to him that he was expected to make use of the school’s computer lab. “She had planned and booked computer room time for different computer activities before I had gotten there,” he commented. The computer lab at the school was popular, and as a result it needed to be “booked weeks ahead of time.” Given that the lab had been booked, William made use of it by implementing a lesson similar to one he had contemplated prior to his placement. He described the lesson as follows:

For a science lesson, the class went to the computer room and used the computers to explore a website on pulleys and gears as part of their Grade Four science lesson. I had them visit a website called Edheads.com. It combines interesting characters and animation with fun questions and easy-to-understand explanations of simple machines. Most students seemed to enjoy the website and using the computers although some of them were more concerned about getting as many answers correct as possible rather than the logic behind the answer.

During William’s first week he also attended an assembly for the junior students

in which a police officer used ICT in his talk about the Internet safety. Referring to the police officer's presentation, William recalled,

He used MS PowerPoint in his presentation which helped to reinforce the points he was making, however, many of the slides contained a lot of information which I don't believe many students read through. I think that more concise points would have had greater effectiveness in this situation as the material was rather complicated to understand at times.

At another school assembly William observed teachers using overheads to present text, and also witnessed the incorporation of a short music video. Early in his placement, William got the sense that ICT was being used by teachers throughout his placement school. He reported, "All-in-all, it seems that many teachers seek ways to incorporate technology into their lessons in order to vary the way they teach and to make lessons more interesting."

Week 2

"As I had seen various examples of ICT being used in week one and had learned what technologies were therefore available, this week I tried to incorporate this technology into my lessons", reported William. As per the guidance of his mentor teacher, William included two short videos into the science unit he was teaching this week. William liked the idea of showing videos to his students because, in his opinion, "they are visually appealing, interesting and provide examples from the real world that relate to what they [the students] study in the classroom." According to William, by using video technology he was able to "complement and expand" his science lessons. Although William was keen on using videos, in order to do so, he had to face some of his personal doubts about his ability to use video technology. As it was his first time showing a video, he had familiarized himself with the equipment setup at recess, and found that "It worked

fine.” However, when he went to play it for the class it failed to play. William described himself as being “frustrated” by the experience.

Like I said, I’m not very good with technology or using electronics . . . So for about ten or fifteen minutes I was struggling to get this video playing. The students were like ‘do this, do that.’ I wanted them to be quiet, as I wanted to get this figured out. When I walked around the back I saw that the cord had come unplugged.

Reflecting on that incident, William later recalled, “My confidence rapidly disintegrated when that audio visual problem occurred . . . But that is not going to influence my approach to teaching in the future at all.”

William’s visit to the computer lab in the previous first week had given him a chance to assess some of the resources available to him. He had found a music program called Music Ace II, and after familiarizing himself with the software, concluded “that it was a fantastic way to learn music.” William was excited to have access to this program, as he was been nervous about teaching music. He explained:

I don’t know the first thing about music or how to go about teaching it. To draw four lines on the board and to start teaching the notes would be really tough for me and really boring for the students. But to have an interactive program that they can go to and learn these different notes, that’s different.

During his scheduled time in the lab, William had his students use the program for a “short lesson on music notes.” Despite what he called some “criticism” from the students, William was convinced that the program had “more upside than down.” Overall, he found that most of the students enjoyed the activity. William was particularly pleased with software, as it helped him teach a topic that he personally found to be particularly difficult.

Week 3

In the third week of placement William “continued teaching lessons, occasionally using ICT in doing so.” He considered the overhead projector to be an example of a “low-tech” device that was particularly useful. He used it “several times to introduce new information or to review material from previous lessons.” William found that using this technology provided him with “a break from writing information on the blackboard.” Furthermore, it was his perception that the students were able to “pay better attention” when he used the overhead. William suspected that his students appreciated “seeing information presented in a different manner.”

Once again William made use of the classroom television and DVD player for his science lessons. “It helps me to teach the unit,” he reported. “I can move the video back to let students watch something a second or third time or pause the disc for a short class discussion or to elaborate on a particular aspect of something.” After the experience of the previous week (unplugged cable issue), William was now more comfortable with using the television and DVD player.

During the third week, William “had an interesting conversation with another teacher about a new form of ICT that is being used in her classroom.” He recalled learning about the program and his initial reaction:

The program is called Kurzweil 3000 and it allows students who have difficulty reading to use a notebook computer which reads for them and helps them to do better academically. The teacher noted that she has five students in her class who are in the program and explained that because of the program, students are not held back on account of reading difficulties. While this is a valid argument, I couldn’t help but think that if students do not learn to read independently while in school, there might be an increased likelihood that they will not learn to read at all. And although it [the computer program] helps them to complete their schoolwork and study at the same level as the rest of the class, the Kurzweil program could very well limit their reading ability and progress. I hope to visit

this class in the last two weeks of placement to see how the program is used and how students respond to it.

Week 4

Despite being eager to see the Kurzweil reading technology, due to time constraints, William did not have an opportunity to see it in use this week. He did however have a couple of other ICT related experiences during his fourth week. The first experience involved William's plan to show a web-based video on simple machines to his students. As William reported in his journal, he encountered a small problem with his plan.

The video is on the internet on the popular website *Youtube*. Access to this website is blocked on the school computers due to concerns about content. This is completely understandable as there are many questionable and inappropriate videos on this site which should not be accessible from schools. There are videos however that are very appropriate and would interest students as well as enhance the lesson and students' understanding of simple machines. So the challenge for me is to find a way to show the video in class without accessing the *Youtube* website. I have previewed the video and gotten the teacher's permission to show it, so I just need to find a way to do so.

In the end, William was unable to find a solution to the issue. Although he did go ahead with his lesson, regrettably it was without the web-based video component.

It was during William's fourth week that he learned of a technology in his school that was "being used to help children with special learning requirements remain in a regular classroom." In passing, William had noticed another "teacher wearing a headset with a small microphone while teaching her class." He reported:

I did not have an opportunity to visit the class, but I later found out that two students in the class are hearing impaired, so when teaching, she wears the headset and her voice is transmitted to the headset that the student wears. This way, the student can follow the lesson and the teacher does not constantly have to worry about whether or not she can be heard ... I think it has benefits for all students and gives the teacher the opportunity to incorporate technology into the class in order to teach more effectively.

Week 5

In reflecting on his fifth week of placement, William once again espoused the value of the traditional “low-tech” overhead projector. He reported:

I learned that overhead projectors are a great way to teach division when using manipulatives. It is much quicker than the blackboard to show to students how a certain quantity of counters can be divided into separate concrete groups ... I would seriously consider giving the overhead projector a permanent place in the classroom so it may be used more often.

William also continued to make use of video technology (television and DVD player) in both his science and language arts lessons. Referring to a language arts activity that involved a video, William commented:

I believe that it did not feel like an assignment to them ... My thoughts on the use of videos in the classroom, both as an educational tool and as a reward, have substantially changed over my placement. Far from the grainy, unsophisticated and ho-hum videos I watched as a student, the videos available today are far superior and seem to more effectively combine an educational message with entertainment. As a teacher, this experience has convinced me that videos should be a regular inclusion in any teaching program.

It was William’s perception that advances in technology had at least in part contributed to the improved educational effectiveness of videos. In William’s view, ICT, at least as it pertained to showing videos, could make education more entertaining for students. He reiterated this notion again in his final week when he learned that his school had a digital projector. He did not have an opportunity to use the digital projector himself, but was pleased to see teachers in the primary division use it to create a “cinematic experience” that “students clearly enjoyed”.

William also found time during his final week to “briefly stop” at the classroom that contained Kurzweil reading software to help students with reading. “It wasn’t really what I expected,” he reported. There were five computers alongside one wall of the

classroom, but no students were working on them. William was disappointed that he had not seen the software “in action.” He had wanted an opportunity to “see how students used and responded to it, but ... this week was busy.”

Prevailing Perspectives and Future Intentions

Although William had entered the placement feeling a little apprehensive about his ability with using ICT, he felt motivated and even compelled to use it. “With the resources that were available there was no reason not to use them. It would have been a crime not to use them.” According to William, “Everything has been trial and error. That is how I have learned to use computers and other forms of ICT.” For William, it was simply a matter of “familiarizing” himself with the ICT available to him on his placement. Based on his experiences, he was confident that he could learn to use any ICT he needed to, providing that time was “available to do that.” William summarized his reasons for wanting to continue developing his ICT skills by stating that

Going through the classes at school [the preservice program] and by being on placement I have seen how valuable ICT has become to teaching. I think that in the future it will take on even greater importance in terms of how teachers deliver lesson. For myself, I would definitely like to improve my knowledge of ICT and how to incorporate it into lessons. I guess I basically need to spend some time working with it.

According to William, integrating technology allows him to make “lessons more interesting” and “to vary the teaching styles” he brings into the classroom. In his opinion, ICT “has given educators more options.” Referring to his placement experiences, he suggested:

I would just get bored writing on the chalk board for example. So being able to use videos, overhead projectors, computers, they all help to make lessons more interesting I believe. The students definitely seem to enjoy it.

William had come to believe that when used selectively and discerningly, ICT permitted

both teaching and learning to be more appealing. “I like using ICT to compliment lessons or to compliment particular units,” he offered. “I don’t think it should be used to teach an entire unit. I like to add it in at different times, such that it keeps things interesting throughout a unit.” When asked if ICT should be incorporated into K-12 classrooms, William replied bluntly, “I believe it should.” As he expanded on that notion, he offered insight as to why he felt ICT use could result in “more interesting” educational experiences:

For one, students are much more proficient with technology these days. They use it at home, so to spend most of the day in a classroom where ICT is not being used would not be very interesting. As well, ICT is very useful for helping students learn. I remember taking my students to the computer room and I could really see how much they enjoyed using the different computer programs ... They seem to enjoy working at computers more than working at their desks.

According to William, ICT has the potential to make educational activities more enjoyable, more interesting, and more relevant to the real-world experiences of students and teachers. William cited his experience of using EdHead.com to teach simple machines as an example of successfully integrating ICT: “That was really interesting. Even I enjoyed it – and it’s meant for junior students. It’s very informative, and has awesome graphics and lots of noises – almost like a video game.”

Reflecting on his five-week placement, William suggested that he had been “pretty impressed with how often ICT was integrated into the classroom.” By way of his experiences he had “gained ideas on how to incorporate and utilize” ICT in his lessons. He continued, “It has also encouraged me to take the use of technology several steps further which I intend to try in the future.” In particular, William expressed an interest in incorporating a digital projector into his future teaching to better create visual learning experiences. He had been asked to return to the school in the spring to teach a lesson on

castles, and now that he knew the school possessed a digital projector he was intent on using it to incorporate a photo presentation into the lesson.

Referring more broadly of his future intentions as a classroom teacher, William expressed a general commitment to incorporating ICT. “I would definitely include ICT in the classroom,” he confirmed. When asked specifically how he foresaw himself using ICT in the future, he enthusiastically responded,

Using videos, DVDs, I would like to do lots of computer related activities like web-quests. Maybe a blog, or an online journal for the class, that could be posted on the school website, or maybe only open to members of the school community.

Summarizing his sentiments and consequent intentions, William concluded frankly: “I would like to use ICT as much as possible.”

Case #2 – John

Full steam ahead

At the time of the study, John was a 26-year-old male preservice teacher. He held a Bachelor's degree from a mid-sized university in New Brunswick and a Master's degree from a small university in Ontario. Prior to pursuing post-secondary education, John had completed his elementary, middle, and secondary school studies in Nova Scotia. After completing his undergraduate degree in 2003, with a major in Psychology and a minor in Spanish, he began working as a technical support professional for a large multinational computer technology company. After one year of providing computer-related technical support, he left that position and relocated to Ontario in order to pursue graduate studies. In 2006 he earned a Master's degree in Clinical Psychology, and subsequently entered the teacher education program at Lakehead University in 2007. His teachable subject for the program was designated as History.

Foundational Experiences and Perceptions

According to John, he had “always been an early adopter of ICT.” He felt that he had grown up in an environment that encouraged him to learn about and use new technologies. He had been eight-years of age when he first encountered computer technology in his home. “My family owned a PC (286) way back in 1989,” he recalled, “and from that machine I learned the basics.” Furthermore, John attributed his early familiarity with ICT to the “computer day camps” he had attended during the summers of his adolescence.

At school John “did very well in computer-related classes” and was grateful for his experiences with ICT. “I think that compared to a lot of students I was rather lucky

because I did have a fairly rich experience with ICT in school,” he explained. “I had kind of a strange middle school and high school experience.” According to John, his school-based ICT experiences had occurred early in comparison to others of his age group. In fact, John had used the Internet for the first time in 1995 while in the eighth grade. As he recalled it, his middle-school had been at the forefront of ICT adoption and implementation:

My school in Nova Scotia was one of, if not the first in the province, to become connected to the Internet. It was part of a pilot project. I remember way back in Grade 8 first being exposed to the World Wide Web and thinking that it was pretty awesome. Every student in my high school had an email address. As part of the pilot project we each had our own email address, we used it to communicate with each other and sometimes the teachers if they were on-board with it.

It was at that time that John had “started using computers for communicative purposes.” Most of his teachers “were pretty good with it [ICT]”. There had been “some really keen adopters of it”, and John recollected that a culture of ICT-use had developed among his classmates. “So even during our lunch breaks or recesses we would go to the computer lab and send each others emails,” he explained, “so we became pretty good users of it.” As John recalled it, there were a “good number of student in my grade were very proficient at using ICT.” John included himself in that category. Upon entering Grade 10 he, along with several others from his cohort, had enrolled in an elective computer related studies (CRS) course. The course focused primarily on developing technical skills associated with programming and webpage development.

John’s regular use of technology continued into his undergraduate and graduate degrees. In his first year Spanish labs he used specialized computer software to assist with language acquisition, and in his psychology courses he used statistical analysis software for analyzing research data. In general, he recalled that ICT had been present in

classrooms, but that its use was not widespread:

It was integrated, but it wasn't integrated so much. There were some professors who used PowerPoint or similar presentation software. I guess it was fairly seamless when it did occur, but it didn't seem to be that prevalent then.

John's exposure to ICT happened primarily outside of the classroom, and it usually involved the use of his personal computer. Be that as it may, as he recalled it, his ICT use at home was often related to his studies. He explained, "In undergrad and grad school I used my computer to communicate, write assignments, do photo manipulation and archive photos, and run SPSS [Statistical Package for the Social Sciences] stats software."

Although various experiences helped John develop his ICT-related skills, he primarily credits his employment and secondary school experiences. "I did have a wide variety of skills before then," he explained, "but after I started working ... I feel like that boosted my knowledge a lot more." During his one year of work as a technical support professional, John had participated in numerous internal training programs and encountered a plethora of situations involving ICT. "I would say that I am quite proficient with ICT," John suggested as he continued to reflect on his skills and their origin. "That stems from my natural ability and a lot of encouragement from teachers in my high school and my own employment."

By the time John entered the teacher education program at Lakehead University, he described ICT as being "pervasive throughout my life." In addition to using email to communicate with friends, John was regularly using various ICTs to "watch DVDs, listen to music, browse the internet and play the occasional game." Furthermore, he was regularly using the word processing software on his laptop to complete school

assignments. Acting on his general interest in ICT, John enrolled in the elective educational technology course offered within the preservice program. With respect to that course, John reported, “I found that it was quite helpful in the sense that it helped me think of different ways of integrating ICT ... we needed to be creative, and I think it worked out well.” He continued, “I had intended on integrating ICT before the course, but it certainly gave me more ammunition so-to-speak.” When asked about the use of ICT in his other courses, John responded,

When I was doing my MA [graduate degree] we were doing presentations all the time. That carried on into the first semester of my preservice year in the sense that when I had an opportunity to use ICT in the classroom for a presentation I would really try to use it.

Approaching the practicum phase of the first semester, John was enthusiastic and self-confident about integrating ICT into his practice teaching. “I have already planned to use MS Paint to teach students isometric diagrams in math,” he reported, and “I hope to incorporate ICT in other ways.” When asked about his perceived ability to use ICT in a classroom, he responded, “I feel pretty competent with respect to this. I think there is a wide array of tools available that many people might not think to use.” John was confident in his abilities with ICT, and expressed no hesitation towards his plans of integrating ICT during his upcoming field-based teaching. “I am comfortable with ICT and I see my lessons which incorporate it as an extension of that comfort,” he asserted. However, John’s comfort level with ICT was not the only thing that had prompted his desire to integrate ICT. He believed that “the more familiar students are with these tools, the more capable they’ll be to use them in the future.” Additionally, it was his contention that “these sorts of activities [the kind that involve ICT] are generally engaging.”

The Field-based Practicum

John's first field-based practicum took place in a city located in northwestern Ontario. He was assigned to a Grade 8 class that was comprised of 24 students. With respect to ICT, John discovered that his classroom contained five computers. One of which was located at the teacher's desk, and used "for last minute planning changes, printing, inputting marks, etc." The other four computers, located at the back of the room, were for students. These computers had network access and were connected to a printer. They also had "a lot of educational software on them," but John "didn't really see the students using that software." John's initial perception was that the software was not advanced enough to engage the interests of the students. "A lot of it was not really appropriate for the age. They [the educational software] seemed more for Grade 4 or Grade 5." On the rare occasions that John observed students using the computers in the classroom, "it was because they were researching something on the Internet." John projected that the library computer lab, which was just "down the hall" and contained twenty computers, was a likely going to be a more suitable environment for activities that involved computers. As a result, he resolved to make use of the lab during his practice teaching. Furthermore, after discovering a portable LCD projector in the computer lab, John expressed an interest in incorporating it into some of his lessons; he was certain that he would "think of some good uses for it."

Week 1

John found that the first week of his placement passed quickly, and he was "left wondering where the time went." He had started teaching almost immediately, and consequently had spent little time observing his mentor teacher. Speaking of his mentor

teacher, John commented:

I don't want to say that he discouraged it [ICT use], because he didn't, he certainly encouraged me to use it. I didn't do a lot of observation of my associate teacher because he wanted me to jump-in as soon as I was comfortable, and I was comfortable from the very first day ... when he saw some of the lesson plans that I had created, he really enjoyed them and thought they demonstrated creative ways of doing it [integrating ICT into teaching]. I definitely received support. I didn't see a lot of it being used, mostly because I didn't have the opportunity to see it being used.

Despite the perceived lack of ICT-modeling by his mentor teacher, John was eager to try using ICT in his own instruction. In fact, on the first day of placement, John took his class to the library's computer lab and implemented the lesson on isometric diagrams that he had planned in advance. This pixel art activity required students to use simple graphics software (MS Paint) available in the lab. John deemed his lesson to be a success; and recalled in his journal:

The students were encouraged to be creative with their buildings, and some of them were incredibly detailed ... I was very impressed with the quality of work that was produced in this activity. In addition to the students giving some very high quality work, I noted that all students were very engaged in the task ... even some of the students who, by the mark book, appear to be struggling.

Although John promptly made use of the library's computer lab on the first day of his teaching placement, it was to be the only such instance during his first week. "One challenge that I faced," John reported, "was planning time for the students to go into the library, as I have quickly learned that very infrequently does time pass as you think it will in the classroom." He soon realized that the demands of his busy classroom made it difficult to find opportunities to visit the computer lab; a lack of time was constraining to his desire to integrate ICT into student activities.

According to John, aside from the aforementioned computer lab activity, the primary employment of ICT during Week One concerned the use of his own laptop

computer. John perceived his laptop computer to be of particular importance to his preparation of lessons. “I have used the computer mainly for planning my lessons,” he reported. “In our planning time, which occurs in the morning after first period, I have found it useful to have my laptop available to provide me with an opportunity to change lessons at the last minute.”

Week 2

As was the case with his first week on placement, John found that his second week went by fast. Overall, John described his ICT integration as being “fairly light”, as he opted to spend more time “working on classroom management and things of that nature.” He had an opportunity to input student marks into his mentor teacher’s computer, and continued to use his own laptop to create lesson plans. “I find that having a laptop at my disposal really increases my productivity,” he commented in his journal.

John experienced an ICT-related challenge during his second week. He reported encountering “a bit of a problem” with the pixel art activity that had carried over from the previous week. He had hoped to compile all of the student’s images into a single collage. This project necessitated that each student save a copy of their image file to a digital memory stick. However, as a result of technical issues with student account permissions on some of the computers, several of the files could not be saved to the memory stick. “After consulting with the IST staff member [a teacher assigned to computer support], who was unable to provide a solution to our issue,” John decided his only option was to request that several students redo their work on different computers. “It was regrettable that these students had to do their work twice,” offered John in his journal, “but we really didn’t have any options available to us, given the limitations of the students’ accounts.”

In the end, after some frustration and additional work, the pixel art project was deemed to be a success. The school's principal told John's mentor teacher that "she really liked the idea." Overall, John felt a sense of pride in the project. He had been frustrated and discouraged by the technical issue, and he expressed no trepidation with respect to using the computer lab again. "I've planned a couple activities for next week which make use of technology," he reported, "and I'm anxious to see how they turn out."

Week 3

In reference to the third week of his field-based placement, John surmised, "I attempted to integrate more ICT into my lessons and it was met with resounding success." In the previous week, John's mentor teacher had told him that many of the students had difficulty making inferences in their language arts class. Thus, building on ideas he had picked up in his first semester language arts methods class, John devised a lesson on inferences. The lesson he planned and delivered made considerable use of ICT:

Over the weekend, I searched online for a few famous photographs – for example, the famous 'Tank Man' of Tiananmen Square and the shot of [General] MacArthur and [Emperor] Hirohito after World War II. I created a Powerpoint presentation and included textual examples from various short stories. During the class, I introduced the concept of inferring by giving them examples of body postures and asking the students to guess what I was trying to communicate to them. Next, we started the Powerpoint presentation and I asked the students to come up with inferences for each of the photographs that I had selected. The students, who were unfamiliar with the photos for the most part, gave a considerable amount of effort in volunteering ideas for the activity. They appeared to be very engaged and definitely seemed to 'get it'. Next, the slides progressed to the textual examples and, once again, the students responded very well to the activity. Suddenly, these students who by all reports were struggling with making inferences from text were reading between the lines of the excerpts of these short stories.

John was delighted with the role ICT had played in this lesson, and particularly the utility of the digital projector: "I think that the usage of the LCD projection was integral in this

activity,” he declared, “as the students were able to use others’ ideas as a springboard for their own inferences, thus making it a collaborative activity where students could learn from each other.” John was pleased to have received “good feedback from the students ... how much they enjoyed it, and that they got it [the concept of inferences].” In fact, John perceived the lesson to be so successful that he decided to implement it again:

They enjoyed the activity so much, [that] I decided to reinforce it the next day by giving them a few more examples. Once again, they enjoyed working with the images and it was clear that they understood the task. I also used some news articles obtained from the web in order to present two viewpoints on the same event to the class as an exercise in media literacy.

Reflecting further on his use of the LCD projector for this lesson, John reported, “I thought that it had the effect of making it a collaborative activity in which the whole class could get involved.” John would later indicate that this experience motivated and excited him with respect to ICT use; the lesson as had been “really rewarding.”

Ironically, John’s use of the LCD projector during his third week also resulted in a frustrating situation for him. More specifically, it resulted in “interpersonal conflict over the technology.” John recalled,

There was one incident where I failed to connect the LCD projector back to its original configuration. Even though I had been a model student up to that point, in terms of hooking it back up properly every time, I ended up getting chewed-out over it in public, and that was a little frustrating. This was in the staff room by a person who was in charge of looking after the technology. So even though she had commented on my diligence in hooking it up properly the previous day, I ended up getting in trouble for not doing it perfectly that one particular time.

Although John felt humiliated by that experience, and “a little bit hesitant” to use the LCD projector again, he ultimately determined this event “was one small hiccup” in an otherwise successful week. “Next time I’ll be more careful,” he reported in his journal.

Week 4

“This week, I’ve further employed my ICT usage by doing a couple things that seem to have been really well-received”, affirmed John at the end of his fourth placement week. Again, John’s ICT usage included the use of the LCD projector to show media to his students. In this particular instance, it was used to introduce a music and dance project:

Firstly, I showed the students a video clip on the LCD projector that I made of myself dancing to Kung Fu Fighting back in 2000, at the request of my associate teacher ... We used the video as an exemplar and were able to create an assignment from it where the students were to make a similar video – either of a dance or a dramatic lip-synching. The students went absolutely crazy over this presentation, which we had built up as a big surprise, and they requested to see it a couple times.

Following the demonstration, John gave his students an opportunity to use traditional camcorders or digital video cameras to make their own multimedia presentations. They were given class time throughout the week to produce and record their own work, and were informed that in the subsequent week they would be presenting their productions. John noted that almost all of the students had access to their own video equipment, and he perceived most of them to be very comfortable using the technology. He was encouraged by the apparent enthusiasm his opening demonstration had generated, and was eager to see what the students would produce. “My associate teacher loved the lesson ... The students loved it,” reported John. “Next week, they present their videos and I’m sure I’ll have something to say about that.”

During the fourth week of the placement, John also used the LCD projector and his laptop for a geography lesson. He introduced his students to their new geography unit by showing them a couple of episodes from the BBC’s Planet Earth documentary series.

He used his laptop's DVD player and the digital projector with the intention of creating a cinematic atmosphere. "Generally, the students enjoyed these movies," he reported. However, getting the audio to work for these presentations ended up being a "minor challenge". This was "because the speakers on my laptop are poor for a classroom," commented John, "and the speakers for the LCD projector are difficult to transport effectively."

Overall, John found that having his laptop at school to be particularly helpful. Collectively, his students were writing a poem to be presented as part of the upcoming holiday activities, and as John described it, his laptop was

pretty useful in this endeavor, as it allowed me to edit and compile the poem within an hour (planning time) and have the poem ready for presentation to the class in a presentation format on the same day I collected the students' work. I found that having this tool at my disposal allowed me to very quickly and efficiently get the finished product to the students and allow them to start working on practicing their presentation.

John strongly believed that having his laptop at school enabled him to maximize his efforts during planning time and thus benefited his teaching.

Week 5

John reported there being "little time to instruct" in the fifth practicum week – which directly proceeded the holiday season. His classes were "being interrupted so frequently and unexpectedly," that he found it "difficult to plan anything except in the most nebulous or flexible sense." Accordingly, in his last week of the placement, John felt "rather hesitant to come up with structured computer time for the students." However, he did find time for the students to present the videos they had produced the previous week. John described the productions as being "incredible." He further commented:

The students stepped up on this assignment and we had some genuinely hilarious projects being shown. We end up using USB keys, memory cards, DVD, and old-fashioned VHS to present the material, and everyone was able to show their video. It was a great, great project and one that I hope to incorporate in the future.

Prevailing Perspectives and Future Intentions

John's field-based placement experiences reinforced many of his early perceptions regarding the educational use of ICT. He had entered his placement with an enthusiastic attitude toward using ICT, and he sustained this attribute throughout his practice teaching experience. John felt confident and competent with respect to his ability to make use of ICT. "I guess I tried to incorporate ICT whenever I could," he reported. Although he had encountered several "challenges with ICT" during the placement, in his opinion, these "were mainly of a minor sort." Technical issues or "malfunctions" associated with the use of ICT did not intimidate John. "I find that if something is not working properly I just recheck everything, and try to do a little troubleshooting," he offered. "If it [the issue] gets to the point where it looks like a completely lost cause I usually have a backup plan, and I go with that."

Reflecting on his five weeks of practice teaching, John commented, "I have tried very hard to incorporate ICT into the classroom, especially after I saw how well it engaged the students." He was astonished at how well the students responded to activities that involved ICT. "I'm surprised that even something as simple as presenting information in a more dynamic format – I guess I shouldn't be surprised – that it was just so much better at capturing the students' attention. I was amazed by that." Expanding on that notion, John asserted:

I absolutely think that ICT should be incorporated whenever possible. I found that from my own experiences with the Grade 8 classroom, that using ICT definitely kept the students attention more than a more traditional method would have. So

throughout my placement I did some writing on the board, some writing on chart paper, and some PowerPoint presentations. I found that despite the fact that the same type of information was being presented each way, the students were more engaged when I was using the PowerPoint slides.

Reflecting specifically on his use of the LCD projector for delivering PowerPoint presentations, John remarked: “I am not a huge PowerPoint fan, but at the end of the day I can say with confidence that PowerPoint slides work much better than overheads and chalkboards in terms of holding students’ attention.” In John’s opinion, this particular technology enhanced instruction; “I think that using the LCD projector for incorporating graphics and photos was useful,” he stated. “With a traditional overhead it would have been difficult.”

When asked about how capable he felt with using ICT during his placement, John noted: “Even some of the teachers at the school would ask me for assistance with hooking things up and general troubleshooting for their own problems. So, yes, I felt quite capable.” His self-confidence was heightened by the fact that others viewed him as an ICT expert. In fact, John perceived that his “use of ICT was heavier than that of most [teachers in the school].” Given that he “had *carte blanche* with the LCD projector,” his understanding was that many in the school were not comfortable with using ICT. “The way I see it, if more people were comfortable with it, it would have been a lot harder for me to get the LCD projector. There was only one for the whole school, and I was always able to get it.” John added, “I think that this will change as more tech-savvy teachers enter the workforce.” In the meantime, John suspected that he would be rather unique; a leader in the adoption of educational ICT. He mused: “for the first little while in my career I expect to have pretty good access to such materials [ICTs].”

Upon being asked if he intended on incorporating ICT into his future teaching, John replied, “Absolutely – without a doubt ... ICT, even at its most basic level, allows lessons to become more dynamic than they would be otherwise.” According to John, by integrating ICT he was able “to be a little more dynamic” with his teaching.

I think that it [ICT] is a tremendously valuable resource that a lot of people underestimate. I think that a little bit of familiarity [with ICT] will go a long way with your students. This generation coming up is widely known to be very proficient with using computers. I think that if you try to incorporate computer technology into lessons you are implying that you value those skills. They [the students] will be able to connect with you on that level, and will end up being more engaged in the class.

John felt strongly that his familiarity with ICT helped him to “use it competently” to effectively engage his students. Overall, he had been encouraged by the outcome of his integration efforts during his practicum placement. He had “found that even something as simple as presenting information to students using ICT rather than the blackboard or something – even something as simple as that – seemed to influence the engagement level of students.” Moreover, John believed that his ICT-rich background permitted him “to think outside the box and to be able to think of different [ICT] applications.” He felt that he could “be creative” with ICT. “I think it allows you to incorporate graphics ... animation, and things like that ... where it was not possible before, which I think will help keep students interested.” In general, John understood ICT to facilitate the attainment of educational objectives. “I find that using ICT can help students integrate information more easily,” he mused, “... it gives some students a chance to succeed where they may not have been able to before.”

“I certainly intend to use it [ICT] in my next placement,” offered John as he pondered his future use of ICT:

Whether my [next] associate [mentor teacher] is encouraging of that is something that remains to be seen. Obviously when you are in a placement and don't want to step on any toes. You want to grow as a teacher where possible, but if that means stepping on someone's toes to do it I'm probably not going to do it.

As for his future as a teacher with his own classroom, John was more certain about his ICT-related plans. "I think for my own career, ICT is something that I will be incorporating wherever possible," he reported. "I will definitely go full steam ahead with incorporating ICT." Despite his perception that he had successfully integrated ICT into his first placement, John felt that there was still more he would have liked to have done. Specifically, he was disappointed that he had not scheduled more "structured computer time" for his students. "Hopefully, in the future," he mused, "I will be better able to use library/computer resources a bit more effectively."

Case #3 – Sam

I plan on trying to if I can

At the time of the study, Sam was a 47-year-old male who held two Bachelor's degrees. His first degree, which was obtained from a small university-college in Ontario between 1983 and 1986, was in Psychology. Following that degree program, and after spending numerous years in the Canadian workforce in various capacities, Sam eventually returned to the same institution to continue with his studies. His second degree, completed between 2004 and 2006, was in Music. Accordingly, Sam's teachable subject for the teacher education program was designated as Music.

Foundational Experiences and Perceptions

Sam does not recall educational ICT as having been a significant component of his experiences as a K-12 student. During that time, as Sam remembers it, "ICT consisted of a UNIVAC computer ... computer courses involved punch cards ... So it didn't get incorporated a lot." It was the late 1970s and computer technologies were not yet prevalent. As Sam recollected it, "The first home computers didn't come out until after I was finished high school ... in 1978." However, he did recall that earlier forms of ICTs such as "overheads, televisions, and film strips" had been part of his K-12 educational experiences. "That was about it," Sam mused, "they were marvelous advances over slate and chalk."

By the time Sam started his first undergraduate degree in the early 1980s, ICTs had started to change significantly. Computer technology was becoming more commonplace, and desktop computing was making the educational use of ICT more practical. Sam recalls that he had been pleased with the influx of new technologies. In

fact, acting on his enthusiasm and interest towards computer-based technologies, Sam had opted to take an elective computer programming course. However, despite having enjoyed the course, it turned out to be the only formal ICT-oriented training would take during his undergraduate education.

Sam recalled that during his first degree, his classrooms all contained televisions that were “wired for video.” An audio-visual department which “had three video players and three channels to work from” controlled the video feeds to each room. Instructors had to make arrangements with the AV department to show a video, and then “had to hope you got the video you were supposed to watch and not a video another class was supposed to watch.” According to Sam’s recollection, although the technology was relatively simple, it was somewhat cumbersome and not particularly easy for instructors to integrate. “But by the time I took my last degree, 2004-2006, things had progressed a lot in 20 years,” offered Sam. “We had several multimedia classrooms. There were three screens, two projectors, and interactive videoconferencing was available.” However, despite this apparent advancement in ICT resources, Sam felt that the technology had gone largely underused. “None of my classes utilized that equipment to the fullest,” he recalled. Of all his instructors, he could recollect only one who had frequently used the projectors and screens to show videos.

As a result of having taught first aid courses in the mid-to-late 1990s, Sam had acquired familiarity with incorporating video technology into instruction. He recalled the experience as having been awkward, “you had to sit there pressing the fast-forward button for three minutes until you found it, rewind, then juggle back and forth until you got the right spot.” Such a recollection underscored Sam’s belief that advances in digital

technologies are making ICT integration “more convenient” for instructors. “I can remember thinking, if this was only on some kind of a digital disk, where you could just jump to the right spot. And that is where they are now. So that makes things much more convenient.” Sam continued, “It saves a lot of time for everybody, saves a lot of preparation, and provides more consistency.”

Despite having had little formal training related to ICT, by the time Sam had entered the Bachelor of Education program at Lakehead University, he considered himself a “techie”. He admitted that he was “not an instant adopter of new technology,” but acknowledged that he was “not that far down the road from the latest technology.” He owned a personal computer that he used on a daily basis, as well as an Internet-enabled cell phone. “I don’t need the latest and greatest,” Sam offered, “but I like to get on board as soon as I can.” As for his ICT-related skills, he considered these to have been “mostly self-taught.” According to Sam, nothing particular helped him acquire these skills: “mostly it was just sitting down in front of the technology and figuring it out.” Sam added:

When I was age ten, I can remember my father coming home with a stereo system from Sears that had wires that needed to be connected. He couldn’t figure it out, so I of course waited until he was done, then I went over and plugged everything in. I’ve always had that intuitive notion of how things should work, and have kept with me that child-like notion that I can try something and it doesn’t matter if I make a mistake. I find that a lot of adults, the ones who are reluctant with computers, are just afraid to make a mistake and think that the computer is going to blow up or that everything will be erased. With the intuitiveness that I have, I can figure out things like the menus across the top [of computer software] and different options. Most of the time they are familiar, they make sense, they are logical, they are intuitive – some of them are not, but I click on them and see what happens. I would not go as far as to say that I’m an expert, but I would say that I’m a very capable user of technology.

In Sam's opinion, he only had "a little bit" of exposure to ICT during the preservice education program. "Some of the uses that I've seen have been interesting," he suggested, but acknowledged that he could only think of a few instructors who actively promoted the use of ICT. Even then, Sam perceived that their use of ICT could often "be a little cumbersome and awkward." He continued, "As we have seen in some of our classes here [in the preservice program] it [ICT] does not always work. That can end up taking up time and can take away from the benefit." According to Sam, rather than actually integrate ICT into their own lessons, his instructors mainly provided directions to helpful online resources; "stuff that I would use or could someday use for my own research to prepare for a lesson." During Sam's first semester, the bulk of his actual exposure to ICT came from the elective educational technology course he had enrolled in. That course, he suggested, had helped him become aware of specific techniques for integrating ICT.

Overall, Sam was enthusiastic about the use of ICT in K-12 classrooms. "The earlier children are exposed to ICT the better prepared they will be for real life" he suggested, "the world outside the classroom is increasingly technology driven." For Sam, incorporating ICT into the classroom was not only about enhancing instructional techniques, but also about immersing students in an environment that reflected the technology-rich real world. He was keen to take on this task of integrating ICT during his practicum; and felt confident in his ability to do so. As he entered the field-based placement, Sam perceived his ability to use ICT in an educational context as "above average." He attributed this to being "able to intuitively navigate and utilize new or unfamiliar programs, and find ways to integrate ICT into program delivery." Sam was

certain of his skills and intentions. In reference to the placement, he indicated: “I am very comfortable working with technology and eager to incorporate ICT into my lesson delivery.”

The Field-based Practicum

Sam’s first field-based practicum took place in a Grade 5 class with 28 students. This K-8 school was located in a small Ontario city. His classroom contained three computers, and the school library was equipped with approximately thirty networked PCs. Sam was quick to initially characterize these ICT resources as being “limited in scope.” Early in his placement, Sam expressed concern over there being “no projector to enable demonstrations and presentations to the whole class.” Ideally, he wanted there to be a “projector available to facilitate PowerPoint or similar co-operative and group activities.” Sam believed that this particular deficit would gravely influence his ability to integrate ICT. Prior to completing his first week of the practicum, he suggested: “I would like to [integrate ICT], although ICT resources within my placement school are limited.”

Week 1

Sam did not attempt to integrate ICT during his first week of placement, although he “did take the opportunity to explore what technology was available to the teachers and students of the school.” He was pleased to discover that students and teachers had “access to PCs connected to the School Board’s intranet, with internet access available.” Sam reported:

In the classroom, ICT utilization by the students consists mostly of using PCs for educational activities, such as word-processing or accessing an extensive variety of network-installed educational discovery activities. Students also have their own personal hard drive space, and their own intranet e-mail account.

He observed students in his class using the PCs “to access a variety of programs that allowed them to explore the human body and the various internal systems, such as circulation, respiratory, and muscular-skeletal.” Sam also witnessed them using “the word processor to prepare and print a final draft of their writing assignments.”

Furthermore, he learned that his class had been “assigned a block of time in the computer lab for *Computer Buddies*, where they [his students] are paired with students from the Sr. Kindergarten class to explore various learning activities on the PCs.”

After having observed and reported on the aforementioned instances of ICT utilization, Sam still expressed concern over the availability of ICT resources. In particular, he was disappointed about there being “only 3 PCs in the classroom itself,” and also reiterated his concern about there being no digital projectors. Nonetheless, Sam did express considerable optimism with respect to the ICT-use he observed:

My overall impression, from observing both mine and other students using the PCs in the classroom and the library computer lab is very positive. Although it could be argued that the available ICT is somewhat limited ... the extent to which the available ICT is utilized is quite effective ... Students are eager to utilize the PCs in completing writing assignments, doing research, or engaging in the educational programs available to them, and do so efficiently and appropriately.

In general, Sam’s observations during the first week led him to feel hopeful about the educational use of ICT. Reflecting on his experience in his weekly journal he suggested:

It seems to me that allowing students exposure and access to this technology makes it, for them, as commonplace as chalk and blackboards or pens and notebooks. The comfort and ease with which they utilize the ICT resources is encouraging, and I would anticipate that as technology advances students who have had this level of exposure will readily adopt and integrate it [ICT] into their daily lives, be that for academic, vocational, or recreational purposes.

Week 2

“Again this week I did not have the opportunity to integrate any ICT into my

lessons,” reported Sam, “I was only teaching 25% [of the time].” He felt as though he lacked the time necessary to integrate ICT, and also found himself questioning the relevance of ICT to his current teaching assignment – introducing a unit on the Government of Canada. Be that as it may, Sam started to think about possible ways in which it could include ICT in this unit as it moved beyond the introductory stage:

I do plan to allow the students some computer time during the next week or so, as the unit progresses, to give them an opportunity to explore the Government of Canada website. My intention is to give them target pages to find, which would have information pertinent to the lessons.

In actual fact, Sam had already started to familiarize himself with applicable Internet resources prior to commencing the unit:

I knew that the first unit I was going to be teaching was on the Canadian Government. So before I left [for the placement] I went on the Net, got some information on government structure, symbols, and stuff like that. So I was able to incorporate some stuff [from the Net] into my lesson plans.

So although he had not yet had students make use of ICT for the unit, it had played a role in his initial planning.

Since Sam was only teaching twenty-five percent of the time, most of his second week was spent observing his mentor teacher and the students. His mentor teacher had reserved time in the computer lab so that students could finish a writing assignment that had been started in the previous week. According to Sam, “this included accessing online (Intranet) interactive programs which provided pictorial and text-based lessons on basic anatomy.” In reference to his observations, Sam reported: “Most of the students seem comfortable enough accessing their Intranet accounts, the interactive programs, and utilizing the word processing program, although there are some who require assistance.”

Week 3

Contrary to Sam's original intentions, his students did not have an opportunity to use the computer lab for a lesson on the Government of Canada. "Due to time constraints," reported Sam, "I was not able to assign the online research assignment." He noted: "access to the computer lab is limited and they have a current assignment to complete, and there are only 3 computers in the class for 28 students." Nonetheless, instead of omitting his planned assignment altogether, Sam opted for an alternative. He explained: "I accessed the website and printed the target pages, and provided [hard] copies to the students." Although the students "did again spend time in the computer lab," it was "to finish their previously assigned work, and to prepare a seasonal writing assignment."

In Sam's perspective, the integration of ICT this week had been insignificant. He was starting to suspect that this was the case throughout the fifth-grade year. "Given the limited technology available," he reported, "it does not appear that the students will be able to have much access to ICT during lessons – at least not at this grade." Sam suspected that students in the eighth grade were getting more experience with ICT.

The eighth grade teacher is assigning his students to develop a Power Point presentation for their culminating assignment in Geography ... the students are doing some of the work on their home computers, and utilizing the teacher's personal laptop to give the actual presentation in class.

After speaking with this particular teacher, Sam learned that the school possessed a digital projector that could be used for presentations. Prior to this discussion, he was under the impression that the school did not have a digital projector. As it turned out, the eighth grade teacher "used it a fair bit." Sam added, "But I think for the most part it stayed in the principal's office. I don't think the other teachers really used it. I don't

know if they weren't comfortable with technology or just didn't have the time to switch into it."

Although Sam had originally expressed concern over there being no projector, now that he was aware that the school had one, he doubted he would actual use it. According to Sam, there were too many obstacles. In reference to the digital projector, he mused:

... there is only one, and it is in the principal's office. If nobody else was using it then we could use it. But even then, the setup of the classroom really doesn't lend itself to the use of it. There is a screen, but given that there are 28 kids in a rather small room – where do you mount the projector? Even with an overhead you have to move students so you can place it the right distance from the screen. So it is a little problematic.

Week 4

"Very little time was available for accessing the computer lab" during the fourth week of Sam's field-based placement. However, his "students were able to utilize the [three] classroom computers to work on outstanding [late] assignments."

Week 5

"Once again, there was little time available for accessing the computer lab," reported Sam, "although students were able to utilize the classroom computers to complete work on their outstanding assignments." Sam cited "the lack of ICT available" and "the time-constraints which limited access to the facilities that are available" as major obstacles to ICT integration. Sam had hoped for an opportunity to integrate ICT during his final week, but was unable to do so:

Had there been more equipment available I would have liked to utilize Power Point and accessed the internet (with my laptop and the LCD projector) to enhance the lessons I was providing. Still, given the way the lessons progressed – i.e. having to provide accommodation for a small group of lower-performing students – I'm not sure how much technology I might have been able to include.

With regards to the integration of ICT, Sam suggested that “the placement was in some ways disappointing.” Arriving at the end of his fifth and final week of the placement, he felt somewhat disenchanted by the extent to which he was able to integrate ICT:

I can honestly say that I did not try. I thought about it, and I gave consideration to whether or not I could incorporate it. But given the time constraints of the day, and the necessity for flexibility, I decided not to go that route. It doesn't matter that you plan to do math at ten after ten, the day can change all of a sudden. I just stuck with the handouts, photocopied assignments, and basic pen and paper activities.

Prevailing Perspectives and Future Intentions

Despite the pessimistic tone of Sam's reflections from his final week of the practicum, he remained enthusiastic about the integration of ICT into K-12 classrooms. “I firmly believe that technology has a place in the classroom,” he stated, “however its implementation depends largely on the facilities available in the classroom.” Sam felt that the practicum had given him a more “practical” and “realistic” outlook on the integration of ICT.

The ideal would be to have the projector on the ceiling, the screen on the wall, the laptop there built-in, and computers in the classroom. However, the reality is that we are not there yet, especially in the schools that are 50 or 60 years old and need to be retrofitted with all of this equipment. It has to be purchased, and you've got 40 schools in a city that are all clambering for the equipment.

The placement “opened my eyes to the fact that sometimes it [integrating ICT] is just not possible,” offered Sam. “You just have to be prepared for what there is,” he added.

While you would like to use ICT, if your school does not have the resources, [or] if you don't have the time to start implementing it ... you can't just plop it into the classroom and start using it, you have to change your lesson plans to incorporate that. So it would be a transition. It is something I would like to do when I have my own classroom, but again, I am going to go in starting off with my paper lesson plan and then go from there. If we incorporate ICT then great; if not, then we will plot along.

According to Sam, the lack of ICT integration during his placement was not because of a

deficiency in his convictions about ICT, but because of obstacles pertaining to time and resource availability. He commented:

I see that it [ICT] has great potential. [However] For a lot of teachers, even the teachers who want to adopt and incorporate it into their classrooms, it does require a lot of adaptation to what they have been doing ... Given the time factor that teachers deal with, I think that might be what's stopping a lot of them [from integrating ICT into their practice], aside from the pure resource aspect of it and the financial aspect of getting all the classrooms equipped.

Reflecting on his five-week placement, Sam mused: "If I had access to the technology, there are some lessons that would have been better. Or at least I hope they would have been better." Referring specifically to a unit he had taught on telling time, Sam suggested:

So an interactive program that I could have projected on the screen and manipulated with a computer might have made things quicker and easier. It may have helped them understand [telling time]. You can draw a clock on the blackboard, divide it into quarters, and colour it with green chalk ... but if you have some kind of ICT-based tool that can flash something on the screen, colour in those quarters in an instant, do the layering, and show passage of time –you would have animated clocks. You can show them the start and stop time on paper, but with the [computer] animation they can see the elapsed time.

Speaking more generally about educational ICT, Sam offered: "I think it could be used, and probably should be used ... where it works best ... There are times when I think it could help provide richer examples for lessons and richer activities." When asked about when he thought ICT worked best, Sam responded:

I think when it gives a sense of interaction to the students. Some of the programs I've seen [during the placement] for human body studies, the anatomy, the organs, the muscles, the skeleton, provide such interaction. They [the students] drag bones or organs onto the outline of the human and try to figure out where it falls into place, and when it is in the right place, if not it beeps at them and throws it back to the starting point. And even with the internal organs, they had to rotate them to get them in the right orientation before they would fall into place. That sort of thing helps them visualize things more than just a picture in a book could. It gives them that much more interaction and the ability to visualize. It's not just a flat 2D picture, but it's almost 3D and it gives them a better grasp of where and how

things fit. That is just one example, any programs similar to that could have similar benefits.

In Sam's opinion, ICT should be "seamlessly integrated as an adjunct."

Elaborating on this notion, he explained:

I mean you could just sit a kid down in front of a computer and say 'click on the human body and click on the skeleton, learn it.' But I think you still need the interaction with the teacher, and to use ICT to reinforce the lesson, use it to help visualize things better, and to make it a whole package. Also, you can use it [ICT] to help capture the different styles of learning. Some kids will learn just by being told or looking at a picture, other kids need to fiddle with things.

Drawing on his own experiences, Sam asserted:

I would say use it, but don't rely totally on it. I think that for now it is an adjunct to what the teacher does in the classroom. It is just to support and reinforce, maybe as an alternative method, maybe part of scaffolding with the students, but not as something to simply rely on. On the day it doesn't work, you have no backup. Once you rely on doing that [using ICT] entirely it becomes problematic. I have seen Profs with overhead projectors, when in the middle of a lecture the bulb dies and there is no spare bulb, and they're stuck.

Emphasizing his position, Sam declared: "In general I think it can be a useful tool, I don't think you can rely completely on it, but it can be a useful tool." He perceived ICT to be a valuable resource for teaching and learning, but certainly not the only resource.

"When I did use it I felt fairly capable," offered Sam as he considered his level of comfort with ICT during his placement.

I mean some of the [computer] programs the kids were using were things I had not seen or used before, but again, it wasn't anything I had difficulty learning, it was just using common sense and being intuitive. So when they needed help I could say 'try clicking here, yes this looks right, way to go.' So it wasn't anything that generated frustration. I felt confident.

According to Sam, for him, self-confidence was not an obstacle to ICT integration. As he saw it, resource availability would dictate his success with incorporating ICT. When asked if he would attempt to integrate ICT during his next practicum, he asserted: "I plan

on trying to [integrate ICT] if I can. Again, it depends ... I don't know what resources they have available yet ... If possible I will, if not I will do what I can."

As for his future as a teacher with his own classroom, Sam was only slightly more certain about his ICT-related plans. He possessed some specific ideas about what he would like to do, but remained pragmatic about potential obstacles:

I intend to incorporate some elements. Obviously what resources my school has will have an effect. Some of the resources I could bring myself. I would bring my own laptop. If I didn't have a digital projector I might consider bringing my own, so that I could do PowerPoint or even show a YouTube video. I would try to incorporate it [ICT] where I could, keeping in mind that we have rather stringent deadlines within the school year, school week, and school day. There is limited time to get things done.

Sam expressed that he had no intentions of relying completely on ICT, but did have a desire to incorporate it in some way if time permitted.

He sincerely hoped that ICT resources would be available in his future classroom. In Sam's view, the infusion ICTs into society was "changing education" – whether schools and teachers "stay on the cusp of things" or not. Accordingly, he expressed the idea that it was important for ICT to play a role in education.

For a lot of the students I think it [ICT] changes their outlook. They knew what we the teachers told them, their parents told them, they learn from maybe what they saw on TV or read. But now it is such a media rich world with the access to the Internet, online messaging, texting, and other forms of communication, their [the students] neighborhood isn't just where they can walk anymore, it is much broader. As a result they are drawing in experiences from other kids or other places and asking questions. I think ICT is influencing how they are looking at their environment and also making that environment much bigger.

As a teacher, Sam hoped to help his students "see how it [ICT] fits into what they are learning." Furthermore, his intention was to show his students that "There is a role for technology in our lives, it does things for us, it is a tool for us, not something to take over, but something to help us do better." The question for Sam was whether the

resources and time would be available for him to follow through on his intentions.

“Where possible I would use it,” he affirmed.

Case #4 – Joan

I want to be proficient with it

At the time of the study, Joan was a 25-year-old female. Prior to entering the Bachelor of Education program at Lakehead University, Joan had earned a Bachelor's degree with a double concentration in English Literature and Women's Studies. Her teachable subject for the teacher education program was designated as English.

Foundational Experiences and Perceptions

According to Joan, her early experiences with ICT were what she assumed to be “fairly standard of a middle class North American student born in the early 1980s.” Joan's family had moved frequently throughout her childhood, which resulted in exposure to a variety of elementary schools in the United States and Canada. Despite experiencing a range of schools, she does not recall ICT being a significant presence in any of them. She recalls, “In my primary and junior years, we wrote everything by hand, and didn't use technology in the classroom.” In her later years of elementary school, some of Joan's schools had computer labs, where she “did exercises in math and grammar, or played games.” When asked if she recalled these activities were effective at achieving educational objectives, Joan replied, “I just recall going in and playing games like Pong. But I don't really see what the educational value was per say from those games.” Overall, Joan characterizes her experiences with elementary school computer labs as being somewhat disconcerting to her:

I don't think I thought much about it at the time. I think I did find it [computer class] a little off putting, because it would mean we would have to leave our regular class, there would using not be enough computers so we would have to partner up, and then sometimes there would be difficulties getting on, getting the games, but that is all I can really remember.

Joan grew up in a household that had a personal computer, on which she “played games and played at using the WordPerfect program.” However, Joan recalls that “little emphasis was put on developing technological skills in the classroom or at home.” As she remembers, “It was not until the internet became popularly accessible that I began to use technology for more academic purposes, and even that did not happen primarily until I was in my post-secondary studies.” Joan summarizes her experiences with ICT as a K-12 student as having involved “overhead projectors, TVs for movies, and computers for games.” The only ICT-related training she possessed was a secondary school typing class.

Although Joan started to use ICT more as she entered university, she recalls that even then her in-class experiences with ICT were “similar” to her in-class experiences during secondary school, “in that my professors did not choose to use WebCT or online communication with their students most of the time.” She explained, “It was not until my last year of courses that I became exposed to WebCT and its benefits.” Joan remembers being impressed with her instructors who had used this online delivery portal to “encourage discussion and participation” among students. Reflecting further on her undergraduate experience, she recalled:

I managed to avoid using technology in my classes mostly because of the direction the course took, or because it wasn't feasible – I didn't have the technology at home, the classrooms weren't equipped for it, etc. I used power point and overheads once or twice, but avoided the whole issue whenever possible. I did use technology at home for research, using the internet to find sources and facts for assignments.

Joan entered the preservice education program with no prior experience using “video or audio technology outside of the home.” Nonetheless, she was willing and eager to try using ICT in an educational context. She noted, “I have always felt that I was

proficient enough to manage a simple power point presentation, or pull up a website to show my classmates.” During the first term of the preservice program Joan had “used ICT a bit more, integrating it into activities in science class, using it for presentations, etc.” She was delighted to have learned how to use the digital projector systems that were available in her classrooms. “I learned all on my own,” she asserted, “and I was very proud of that because it seems to be really complicated. She would later recall, “This made me feel confident when I was on placement. I was 99% sure that any AV equipment we had in our room was not going to be that up-to-date.”

Although Joan had not enrolled in the elective Educational Technology course as part of her coursework, she did express a keen interest in taking steps to improve her ability to use ICT. “I want to be proficient with it,” she stated, “despite my lack of confidence in it.” Toward this goal, Joan had registered for a PowerPoint workshop that would take place after her practicum. She hoped that as a result of the workshop she would “be better able to use it [Power Point] and make it more interesting.”

Despite Joan’s apparent successes with using ICT during her preservice courses, going into her practicum she perceived her ability to use ICT in a classroom to be “amateur at best.” Joan used her own laptop computer on a daily basis for email, word processing, and media applications, but was initially skeptical of her ability to integrate ICT in a classroom. She expressed apprehension over the possibility of trying to integrate ICT during her field-based placement:

I have no formal training with technology, and have found in past experiences that technology often breaks down, or requires extra preparation, which can detract from the effectiveness of the lesson. Also, I feel constrained in terms of my creativity in creating engaging lessons by my lack of knowledge.

Nonetheless, going into her practicum, she had felt strongly that ICT should be used in

K-12 classrooms. When asked why she felt this way, she responded:

children are using more technology outside the classroom, and will need to be proficient with medias and technologies in a work setting, making it necessary to give students a chance to use technology in a structured way, for educational purposes as well as leisure.

Referring to her upcoming placement, Joan avowed “If there are ICT already available, I will definitely use it ... I hope to familiarize myself with the available and existing technology so that I can become adept at troubleshooting should the need arise.” Despite having earlier expressed some trepidation toward her own ability to integrate ICT into her field-based placement, Joan maintained an optimistic position: “If technology is already set up in the classroom, I generally have a good handle on using it.” Given her past experiences, Joan was confident that she could learn to use new ICT if necessary: “I’ve learned how to use technology in classrooms from trial-and-error, and watching what others do.” In addition to using any ICT available in the classroom, Joan also planned to use personal ICT equipment she was already familiar with. She intended to use her own laptop at the placement school, “to supplement lessons and give students a chance to see technology incorporated into learning.”

The Field-based Practicum

For her first field-based practicum, Joan was placed in Grade 4 classroom at a “fairly new” K-6 elementary school located in a large eastern Ontario city. “I was raring to use it [ICT],” reported Joan, referring to how she felt when first arrived at the school. “But I was intimidated about getting resources. I didn’t know if there was equipment available, or if I was going to be able to use it with my class.” The classroom contained four Apple desktop computers that Joan described as being “very dated.” Early in her placement she logged onto one of these computers “to try to find programs.” However,

she quickly discovered that the programs had “been locked up somehow,” and as a result, she “didn’t have very much success.” In fact, over the duration of her placement, the no students made use of these computers.

In addition to being unsure about the functionality of the classroom computers, from the very beginning Joan got the impression that her mentor teacher “wasn’t that keen” on using ICT. “He had it there,” she reported, “but he was more focused on other things.” He did have a computer on his own desk, but used it only for administrative tasks such as staff email, bulletins, and electronic report cards. Joan also had access to a sizable computer lab that could accommodate all of her students. The lab had to be booked in advance, but as she recalled, it “was fairly open.” Joan also discovered that she had access to a TV-VCR system, as well as an “older model” overhead projector that was in her classroom.

Week 1

“This week has flown by; and sadly there has been almost absolutely no use of technology in class,” reported Joan at the end of her first week:

I have been in the computer lab, and other classes use it. However, my class has yet to go down to use it, and my associate teacher is not a huge fan of technology in class. I hope to familiarize myself with the various programs available at the school sometime in my second week, and incorporate technology into some lessons.

Joan admitted that she had not had time to gain a full appreciation for what ICT resources were available at her school, but suggested that her initial impression was that the computer lab was “well equipped.” She anticipated using the computer lab for a research project that her students were about to commence. “I may attempt to have them research their topics on the internet and make charts and spreadsheets,” she reported. Furthermore,

she expressed a desire to make use of ICT “to do some math related and music related work as well.” Joan also pondered the possibility of using video technology “to implement a comparison study” of a film and book for an upcoming unit.

Not only did Joan get the impression that her mentor teacher was not eager to integrate ICT into the classroom, she also noticed that he was at times aggravated by the computer technology he used at his desk. Referring to her mentor teacher, she reported:

My associate does use technology in the classroom for preparation purposes ... He reviews staff email, bulletins, etc. on his desk computer, and has spent the majority of this week inputting report cards electronically, much to his frustration. This of course, has only affected the students in that they have been given independent work to do for longer periods of time while he works on report cards.

Week 2

During the second week of her placement, Joan found that ICT played a role in her own instructional preparation. “So far I have used the in-class technology to access information from the web or from home (sending files through email) to use in the classroom,” she offered. Joan had not yet used the computer lab, but had started to plan how she was going to use it for an upcoming research-based anti-smoking lesson. She was looking forward to the lesson and was optimistic about its potential for success. “I have been told the students are comfortable with navigating the internet,” she reported, “indeed most of them can perform searching online and have wanted to bring in research they found at home.” However, Joan expressed concern that her associate teacher may not be in agreement with her plans to use the computer lab for research:

My associate teacher is not keen on this form of research, as he feels there is little supervision or guidance in how and what the students are researching. As well, plagiarism is a concept that my students do not quite understand; many of them value a learning system where they simply record and represent information given to them from a text or teacher, as opposed to analyzing and incorporating information into their creative exploration of a topic ... Due to these constraints,

my associate has not encouraged a lot of independent internet use for classroom projects.

Outside of practicum hours, Joan was also working on a project for a preservice Media Literacy course “that would involve some students using recording equipment (which my school has), and a video-editing program (which the school has as well).” Not only would this project help Joan meet the requirements the preservice course, she also felt that it “would be beneficial to the students as it would give them a chance to learn aspects of filming.”

Week 3

In terms of ICT use, Joan felt like her third week had “been much the same [as the previous week].” ICT integration was minimal. “I was not able to access the computer lab due to scheduling constraints,” reported Joan. “However, during my planning time I did find some computer programs for students to try out during their math class. I am in the process of setting up some lessons for the next week.”

Once again, Joan’s mentor teacher expressed his displeasure with independent Internet research. Joan noted that “some students brought information in from home that they had researched on the internet.” Her mentor teacher had promptly “rejected the information due to the lack of sourcing, and talked with the class about plagiarism.” Despite his apparent concern over Internet research, Joan realized that her mentor teacher was not completely opposed to integrating ICT into the classroom. She discovered that he uses a digital camera “to record photos of his class’s projects and work.” He demonstrated how he “used this with the students to create a visual record of the progress they are making.”

“My video project is continuing slowly,” reported Joan at the conclusion of her third week. “I am seeking outside assistance with the videotaping, as I do not feel comfortable allowing the students to use the equipment.” Nonetheless, she remained hopeful that she “may be able to give the students a chance to film in guided situations.” It was still her intention to use the editing software in the computer lab with her students.

Week 4

“This week I was more successful in using technology in the classroom,” proclaimed Joan. In class she had made use of an online video for a lesson on anti-smoking. Furthermore, in the computer lab, her students navigated the Canadian Lung Association website. “I deliberately left it [the activity] open-ended for them to explore,” described Joan, “because I wanted them to find information on their own.” She explained:

The core of the lesson had already been done upstairs [outside of the computer lab], we had a lot of discussion, so I wasn't sending them on a fact finding mission, but if they found things they were interested in I encouraged them to write it down for use to talk about. It was mostly for them to find games and play them.

Joan acknowledged that her patience was an important element in the success of this activity, “as the web address was long and complicated.” Although she had designed “the lesson for a class who used technology at home,” she knew in advance that entering the web address was going to be “quite challenging” for some of the students. The supply teacher who was with the class this particular day did not share Joan's patience, and “offered a suggestion to set up the computers before class,” with the web address already entered for each student. “However, I was comfortable with the pace the students worked at,” reported Joan:

Some (most) were adept at navigating the internet and the computer in general, turning it on, finding the link to the home webpage, knowing where the address bar was. Some did run into difficulties with the symbols required in the address, and needed help with those. Once on the website however, my students were able to find different games and information to look at. The site was appropriate to their age and abilities, and we spent the entire class on the website ... the website and the activities were both educational and appropriate to the students' skill levels.

In the end, Joan characterized the activity as “a really great lesson.” She perceived it to be “a huge success because most of them [the students] were familiar with computers.” As she remembered it, “they all just seemed to just go sit down and start pressing buttons. They really were quite comfortable. They found the website and navigated it quite easily. So I was happy with that.”

In addition to using ICT resources available at the school, Joan also brought her own laptop computer to play a song for a cross-subject lesson on music and art.” Joan strongly believed that having her own computer equipment was instrumental to the success of the lesson. “By bringing in my laptop,” reported Joan, “I was able to better control the volume and replay the song as often as needed.” Having her laptop “was so convenient, it made the whole lesson easy.” Referring to the lesson, Joan commented:

They [the students] had to listen to the music and draw a musical story board: They thought it was really cool that I had my laptop, and they all wanted to play with it – I wouldn't let them touch it! It was great. My associate said ‘I see you brought your laptop?’ I said ‘yes, because this is like my library’ ... My associate teacher had a really old decrepit boom box, it didn't take CDs, and it barely played tapes. You know it had served its purpose. With the laptop, I new it worked!

According to Joan the lesson “was fantastic,” and “the students were focused.”

Furthermore, she “didn't have any technical difficulties, delays or distractions.”

Week 5

Joan was pleased that she “was able to use a TV and VHS video” during her final

week. As she explained, this was the only time she had had the opportunity to use this equipment with her class:

In terms of the equipment, that was a little frustrating because we had a TV and VCR, but one teacher in the school used it everyday, which is OK, but it made my access limited. Also, they didn't have an extensive library of videos or anything like that, so that meant I had to look for them from other sources, and I felt like I didn't have enough time to do that.

Again, Joan made use of the digital camera to provide students with “a visual reminder of the various works they had done.” Although she did not have her students use the Internet this week, she did incorporate images that she had printed from the Internet.

Despite the fact that Joan had originally planned to have her students use the computer lab to do some math related activities, ultimately she decided against it. She reported: “I found it difficult to assess which programs were suitable to my class's unique mix of abilities when it came to Math.”

Prevailing Perspectives and Future Intentions

Reflecting on her use of ICT during the five week field-based placement, Joan recalled, “I think I realized I was more confident with it than I had thought, and more capable than I had thought.” Nonetheless, she admitted that her integration of ICT was in no way extensive. She felt like there had been an “abundance of technology available,” but perceived her access and actual implementation to be rather limited. “I wanted to use the computer lab more than I got to,” she reported. “I used it one day for sure. I felt that was a really great lesson ... Other than that, I used the TV-VCR system once, and the overhead projector a couple of times.” Joan commented:

I think that with the equipment that I had, that was available to me, I was quite capable with using it. I felt capable with using the equipment I had. I felt a little limited knowing how to access the resources. I felt like I was stumbling around in the dark a little bit there.

Although she perceived herself as being competent with the school's ICT, she found it challenging to know what was available. Her mentor teacher had only been "supportive in terms of saying 'sure go for it'." In fact, the one day she used the computer lab, he had been away. "Most of the time when I did use technology," Joan reported, "he took a back seat and said 'take it away'."

As Joan recalled it, the one lesson that she had used the computer lab for was a "really exciting" experience. "Actually, every time I used technology I was really happy, because for the kids it was a treat," she reported. "It wasn't something they did often enough to be run-of-the-mill, so they found it fun, it was something different." Joan gained a great deal of satisfaction from engaging her students with ICT-related experiences. She conveyed the notion that ICT should be embraced by educators, as it has the ability to change education "for the better." Elaborating on this notion, Joan commented:

I definitely think it should be used, mostly because our society is moving in that direction. My students were about eight years old, and they were all fairly familiar with using a computer and going online to use Internet resources, which I thought was a little surprising. Just based on knowing how easily these eight-year-olds pick up the technology and even the concepts and technical terms, I really think it is essential to be relevant as educators by having it [ICT] in our classrooms.

According to Joan, ICT has the ability to help teachers "find areas of interest that really relate to what kids are doing." In her view, "there is so much potential to turn those areas of interest into teachable moments or new information that will support the curriculum."

Building on this insight, she offered:

I think technology has opened the door in a lot of ways, because you can now make use of so many more examples or demonstrations using information communications technologies, and students can be much more hands-on and more creative. I think that is a huge benefit.

Despite her prevailing positive attitude toward the adoption of educational ICT, Joan did admit to at times being hesitant towards integrating ICT during her placement. “I found it a bit of a challenge to use the technology in a way that was meaningful,” she acknowledged. She had hoped to have her students engage in more “open-ended” Internet based tasks, but was apprehensive about giving them too much freedom while online.

Joan explained her predicament:

Mostly I was frustrated with my inability to find activities or videos online that I felt were secure enough to go to. I was really-really nervous about going online with my students because they were eight and nine years old and I didn't want one of them to end up on a website that was inappropriate ... it was a school that was big on safety.

In reference to the proposed video-editing project she had pondered during the second and third weeks of her placement, Joan offered: “I was really keen on trying to incorporate ICT ... but it didn't get anywhere.” In the end, although the school had the necessary equipment, Joan abandoned the project. “I was a little concerned about my class with the equipment,” she reported. “My class was a great class but could be very spirited. I did not want to see a situation where they got into equipment and maybe broke something.”

Joan understood her most significant use of ICT to have taken place “outside the teaching arena.” Although the in-school use of ICT by her students had been minimal, she recalled using ICT on a regular basis for preparation purposes. “I relied heavily on technology and communications to email lesson plans to the school for printing, using the internet to find topic and lesson plan ideas, get resources and scaffolding material on lesson topics,” she reported. “By indirectly applying classroom technology to my lessons, I was able to augment and improve them by bringing fresh perspectives and information

to my pre-existing materials.” Joan realized that her Media Literacy course – which was “heavy on using various media ... going online, finding text online, using video, and photography, incorporating this into lessons, students work and assignments,” – had informed her approach with ICT:

That really influenced what I wanted to do in some ways. Also for one of my other lessons, I got online at home, searched for some particular graphics, and brought them in, and I was directly reminded of my Media Literacy class for that. I was trying to find more relevant or up-to-date graphics for a lesson. I thought if I could go online and find something, I could have the students do that or something related. I ended up just doing it myself then bringing it in for the students. I would say it [the Media Literacy course] defiantly influenced that lesson.

Although Joan had professed that she was comfortable with ICT during her placement, particularly for her own preparation purposes, she acknowledged a desire to further develop her skills and confidence. She felt that formal training would provide an additional boost to her level of confidence. “Well, I see myself as being able to get by,” she stated of her current ability level:

So I don’t feel officially trained, everything that I know about ICT seems to come from trial and error. In terms of the overhead projectors – literally pushing buttons, moving mirrors, and all of that. So I think I was self taught. No specialized training. Same with TVs and VCRs or any other kind of video device – that would have all been from at home, or day-to-day experiences in other settings. With computers, again it is literally trial and error: maybe I was having trouble with a computer program or a document I was working on at home; I learned how to navigate the system then I could apply it to other situations or systems at school.

It was Joan’s belief that all new teachers should engage in formal ICT training. “I actually think it is something that should be taught to up-and-coming teachers ... Maybe as a workshop,” she asserted. Reiterating the notion that formal training was important, Joan mused:

I find that a lot of people, due to whatever their background, don't get formal training for a while, and I think a lot of people feel ashamed. I know I always feel really uncertain and I try to get out of the limelight if it comes to anything technological because everything I have learned is by trial and error. I think there is a need [for training] at the student teaching level.

Joan's placement had reinforced this conviction. In reference to her practicum, she commented:

I was also really surprised, and in retrospect perhaps I shouldn't have been, that a lot of teachers seem kind of leery of using it [ICT]. You have the good old video, but DVDs were a little beyond their scope, or going on computers. My supply teacher who was there for that one lesson, she used to work at that school, and is very-very highly regarded by the other staff, she thought that my lesson was very novel, whereas I thought what I was doing was really actually quite simple.

Joan felt strongly that teachers should make an effort to "model using ICT." Her perception was that "Students don't get to see that enough." In Joan's view, having ICT available in classrooms was critical. "It is essential to the workplace," she offered, "so having it in the classroom as an everyday thing that students are comfortable with I think is really important."

When asked if she intended to incorporate ICT as a certified teacher with her own class, Joan promptly replied: "Yes I do. My pipe dream would be to have a computer station – actually it would be to have enough computers for all of my students to use." She quickly added: "I am hesitant to go that route because I know I may be limited in terms of physical space." Joan's experiences during the practicum had alerted her to the idea that she may need to be more pragmatic in her future approach towards ICT. "I feel that I am going to have to be a little more realistic in terms of cost and practicality," she offered. Nonetheless, she remained eager about the possibility of integrating ICT, particularly in music education:

One thing I do get excited about, for when I have my own classroom, is the idea

of incorporating a computer gaming station, and having games like Guitar Hero and I think there is one called Rock Star. These are music based games that I think would be great to help students build skills in music.

According to Joan, music was just one subject area in which she would like to incorporate a video game system:

I can see incorporating that into my lessons, as well as other video games. I know there are games that have historical content that I see potential in. I would have to do more research to see if they would be appropriate. But it is an example of how technology can be used as an excellent scaffolding tool. It does not necessarily have to be the main source of a lesson, but I think it is a great hands-on way of teaching.

In Joan's view, ICT lent itself to a hands-on or practical approach to teaching and learning. Accordingly, she anticipated incorporating ICT in her next placement and beyond:

My next placement is with a grade eight class, so I'm looking forward to being able to do a lot more with them in terms of going online. If the school has the resources I want to incorporate video. I am going to be asking them to bring in music. I am going to try to incorporate iPods because I'm sure they will have them. Instead of fighting against that [the use of iPods] I might as well use it, because I think there is potential. In my own classroom, like I said before, the gaming system. I would like that. I think that now-a-days it is essential to have a decent sound system of some sort so that you can incorporate music and sounds into your lessons. Also, I'm going to learn how to master one of those digital overhead projectors, but that is in the future, because I don't even know if I will have one.

Joan was mindful of the role ICT would likely play in the lives of adolescents, and hoped harness this knowledge to help her achieve educational objectives in an enjoyable way.

Referring to her prospects of integrating ICT in the future, Joan stated: "I'm looking forward to that because I think it will be fun."

Concluding Remarks

The four preceding case vignettes were drawn from the field data and represent narrative accounts of the ICT-related experiences and beliefs expressed by each of the

four participants. By way of the vignettes, the researcher attempted to provide an avenue by which personal stories could be expressed, significant relationships revealed, and critical episodes could be rendered apparent.

The cross-case analysis of the next chapter examines perceptions of ICT across the four individual cases that comprised this study. In order to do this, the four cases have been compared for emerging themes corresponding to the interaction between beliefs and experiences. In the explication of each theme, particular attention is given to identifying critical aspects of the field-based placement and wider contextual factors that influenced the participants' beliefs.

CHAPTER 5

Cross-Case Findings

It will be recalled that this study set out to investigate the perceptions of information and communications technology (ICT) held by four preservice teachers as they each engaged in their first field-based practicum. More specifically, the aim was to explore and reveal the interactions between the participants' educational beliefs about ICT and their field-based experiences with it.

While the within-case analysis presented in Chapter 5 took the form of a *narrative analysis* that resulted in four case vignettes, the cross-case analysis of the current chapter takes the form of an *analysis of narratives*. This is a paradigmatic analysis that “seeks to locate common themes or conceptual manifestations among the stories” (Polkinghorne, 1995, p. 13). It provides a method to uncover the commonalities that exist across cases, and “functions to generate general knowledge from a set of particular instances” (Polkinghorne, 1995, p. 14). Thus, the product of this stage of analysis is not a story, but a description of the themes that hold across the four cases. The cross-case analysis can be characterized as an inductive process, as the findings emerge from a rigorous review of data compiled during the preliminary within-case analyses.

The results of the cross-analysis are presented as two broad themes that characterize how the participants perceive ICT integration. The themes are: (1) *perceived educational value of ICT*; and (2) *perceived capacity to use ICT*. These two interrelated themes are explored by highlighting common elements across the four case studies. These themes, which represent the salient perceptions that emerged from the cross-case analysis, serve to explicate the interactions between participants' beliefs about ICT and their experiences with it.

In accordance with the conceptual framework outlined in the first chapter, a preservice teacher's *perception of ICT* is conceptualized here as multifarious amalgamation of his/her *beliefs about ICT* and his/her *experiences with ICT*. It is important to note that this study investigated relatively few cases, thus the following findings must be taken as suggestive rather than conclusive. Quotations presented in this chapter are derived from the individual case vignettes previously reported in Chapter 4.

Perceived Educational Value of ICT

The participants in this study all expressed their use of ICT during the field-based practicum in terms of its educational value. Through their narratives, all of the participants articulated experiences and beliefs that reflect their perceptions of, and approach towards, educational ICT. The nature of these perceptions, their origins, and the way in which the participants affirmed them, emerged as they described their experiences and discussed their future intentions. Despite possessing varying backgrounds and experiences, all of the participants perceived ICT integration as something that was generally advantageous to classroom teaching and learning. The four sub-themes that follow help to illustrate the nuances of this finding.

Facilitating Interesting and Engaging Instruction

The notion that ICT can offer a more interesting and engaging method of delivering curriculum is evident in the expressed perspectives of all four participants. The data generated from William's case reveals that he maintained such a position early on. Even before his placement started, William expressed his belief that ICT should be used in K-12 classrooms because it allows teachers "to present information in a more effective and interesting way." This notion was reinforced during William's field-based experience

when he observed that teachers in his school would “seek ways to incorporate technology into their lessons in order to vary the way they teach and to make lessons more interesting.” Commenting on his own ICT-use during the placement, William noted that he liked “to add it in at different times” as he found “it keeps things interesting throughout a unit.” According to William, ICT enabled him to combine “an educational message with entertainment.” He recalled conducting a “very informative” website activity with his students that included “awesome graphics and lots of noises – almost like a video game.” Based on his placement experiences, William perceived that students “enjoy working at computers more than working at their desks.”

John’s case also highlighted the importance of field-based experiences in forming and reinforcing the perspective that ICT integration results in more appealing classroom activities. Reflecting on his five weeks of practice teaching, John commented, “I have tried very hard to incorporate ICT into the classroom, especially after I saw how well it engaged the students.” He had found that ICT allowed him to present “information in a more dynamic format” and thus engage his students. This understanding influenced his intentions to use ICT in the future. “I absolutely think that ICT should be incorporated whenever possible,” he commented after the placement. Based on his field-based experiences, John believed “that using ICT definitely kept the students attention more than a more traditional method would have.” Consistent with William’s notion that ICT could successfully combine education and entertainment in the classroom, John suggested that ICT could allow teachers to incorporate graphics and animation “where it was not possible before.” According to John, incorporating graphics and animation into the classroom via ICT could “help keep students interested.”

Sam's perceived lack of ICT-use during his placement prompted him to assert a similar belief about the ability of ICT to make the classroom more engaging: "If I had of had access to the technology," he mused, "there are some lessons that would have been better. Or at least I hope they would have been better." Although Sam considered his ICT-integration during the placement to be minimal, he believed that ICT had the potential to "help provide richer examples for lessons and richer activities." More specifically, he felt that when used properly ICT could facilitate "more interaction and the ability to visualize." In this regard he thought highly of the human anatomy software he had experienced during the placement. According to Sam, such software could be more effective "than just picture in a book." In a similar vein, John had suggested that ICT "was just so much better at capturing the students' attention."

Perhaps Joan effectively best underscored the perceptions of the participants when she suggested that ICT allowed her to "find areas of interest that really relate to what kids are doing." Joan felt that ICT "opened the door in a lot of ways, because you can now make use of so many more examples or demonstrations." Like the other participants, Joan conveyed the notion that ICT integration could facilitate media rich environments that were both exciting and educational. She described her field-based implementation of ICT as being "fun" and "something different" that engaged her students.

Permitting Societal Relevance

The relationship between society and ICT-use in schools was viewed as an important issue for the preservice teachers in this study. More specifically, the participants' narratives conveyed common ideas about their desire for schools to reflect society through ICT integration. All four of the participants expressed the belief that ICT

could help students make the classroom relevant to the real world. It was evident that this perception was closely related to their desire to create engaging and interesting classrooms. ICT was viewed as a way to bring the “real world” into the school environment. William suggested that he liked using ICT to incorporate videos because “they are visually appealing, interesting and provide examples from the real world that relate to what they [the students] study in the classroom.”

In this regard, the participants’ narratives contain aspects of *using ICT to help teach the curriculum* as well as specifically *teaching ICT skills in the curriculum*. To the participants, appropriate ICT integration meant the classroom utilization of ICT for both purposes. The participants perceived both approaches as a means of aligning the classroom with the realities of society. They believed that classroom exposure to (and familiarization with) ICT in any form was of critical importance. John contended that “the more familiar students are with these tools, the more capable they’ll be to use them in the future.” Likewise, Sam had it that “The earlier children are exposed to ICT the better prepared they will be for real life.” This reasoning was based in his understanding that the world was “increasingly technology driven.” Similarly, Joan felt that ICT should be integrated “mostly because our society is moving in that direction.” Joan stated, “It is essential to the workplace, so having it in the classroom as an everyday thing that students are comfortable with I think is really important.”

In Joan’s view, it is “necessary to give students a chance to use technology in a structured way, for educational purposes as well as leisure.” Joan, like the other participants suggested that ICT was playing an increasingly authentic role in the lives of her students, and because of this she felt it belonged in the classroom. Referring to her

placement, Joan stated:

My students were about eight years old, and they were all fairly familiar with using a computer and going online to use Internet resources ... just based on knowing how easily these eight-year-olds pick up the technology and even the concepts and technical terms, I really think it is essential to be relevant as educators by having it [ICT] in our classrooms.

Along these same lines, William perceived students to be “much more proficient with technology these days.” According to William, “They use it at home, so to spend most of the day in the classroom where ICT is not being used would not be very interesting.” In general, the participants conveyed the understanding that their students valued and embraced ICT in society, and thus should embrace it in school. Perhaps John underscored this prevailing notion best when he stated:

This generation coming up is widely known to be very proficient with using computers. I think that if you try to incorporate computer technology into lessons you are implying that you value those skills. They [the students] will be able to connect with you on that level, and will end up being more engaged in the class.

At the conclusion of her first placement, Joan was already considering how to bring the “real world” into her next teaching practicum. She stated, “I am going to try to incorporate iPods because I’m sure they will have them. Instead of fighting against that [the use of iPods] I might as well use it, because I think there is potential.” Joan’s outlook was not unlike that of Sam, who understood ICT integration as a way of enabling students to “see how it [ICT] fits into what they are learning.”

All of the participants understood ICT as being pervasive in the lives of students, and felt that education needed to keep pace with the resulting changes. Sam felt that this was because ICT “changes their outlook.” He suggested that ICT was resulting in “a media rich world” and influencing how students “are looking at their environment” while “also making that environment much bigger.” Sam, like the other participants, perceived

ICT integration in the classroom as a way of promoting both media and technology literacy among students. In Sam's view, students who have adequate exposure to ICT in schools "will readily adopt and integrate it [ICT] into their daily lives, be that for academic, vocational, or recreational purposes." Furthermore, according to Sam, integrating technology into the classrooms allows students to see that "There is a role for technology in our lives, it does things for us, it is a tool for us, not something to take over, but something to help us do better."

Enabling Student Success in the Classroom

Closely related to the first two themes that were evident in the vignettes was the prevalent notion that ICT is an enabler of student achievement in the classroom. It was the perception of the participants that because ICT could be more engaging and relevant than traditional educational methods, it could also facilitate student success at school. In general, the participants felt that ICT could foster opportunities for success that traditional educational methods could not.

With respect to student success, Joan felt that integrating ICT into the classroom gave students an opportunity to "be much more hands-on and more creative." Similarly, John recalled that as a result of a computer-based graphics activity, his students "were encouraged to be creative." According to John, the use of ICT for this activity allowed all of the students to succeed at the task, "even some of the students who, by the mark book, appear to be struggling." He understood ICT to be a tool that had the potential to "help students integrate information more easily." In his view, ICT "gives some students a chance to succeed where they may not have been able to before." Likewise, Sam viewed ICT as offering a way "to help capture the different styles of learning." Like Joan, Sam

believed that the integration of ICT could provide for a more hands-on and interactive learning environment that would accommodate diverse educational needs.

Perhaps William's narrative contained the most overt references to the role of ICT in accommodating diverse educational needs and enabling student success. After learning of the classroom teacher at his placement school who made use of a microphone and headsets to assist two students with hearing impairments, William proclaimed "I think it has benefits for all students." He suggested that this was an example of how teachers could "incorporate technology into the class in order to teach more effectively." Nonetheless, William encountered another instance of ICT integration that generated mixed feelings for him. After learning of a computerized reading program, known as the Kurzweil 3000 system, being used in his school, William accepted the idea that it could help students "to do better academically." He acknowledged that "because of the program, students are not held back on account of reading difficulties," but "couldn't help but think that if students do not learn to read independently while in school, there might be an increased likelihood that they will not learn to read at all." William expressed a desire to learn more about the program before deciding on its effectiveness, but regrettably did not have time to see it actually being used.

Advantageous But Not a Panacea

William's uncertain feelings regarding the educational effectiveness of the Kurzweil reading program highlights another important aspect of the participants' narratives. While ICT integration was largely viewed by the participants as beneficial, in no way did they perceive it to be a panacea. Although the participants all expressed views in favour of ICT integration, this enthusiasm was tempered with caution based on the

perceived danger of excessive reliance on ICT or the imprudent use of ICT resources. Such caution demonstrated that the participants possessed high levels of discernment concerning ICT integration. The participants each understood their approach to ICT in the classroom as being realistic. Perhaps this theme was most evident in Sam's case. "I would say use it, but don't rely totally on it. I think that for now it is an adjunct to what the teacher does in the classroom," asserted Sam. Due to his own negative experiences as a university student, Sam understood complete ICT reliance as problematic. "I don't think you can rely completely on it," he asserted "but it can be a useful tool." In Sam's view, ICT "is just to support and reinforce." He was adamant in his belief that "you still need the interaction with the teacher ... to make it a whole package."

William, who was eager "to use ICT as much as possible" conceded, "I don't think it should be used to teach an entire unit." Despite being extremely keen to incorporate ICT, William he felt that it was a tool to be used strategically when it could offer educational value. This was consistent with Sam's notion that ICT should be used "where it works best." Similarly, Joan aimed not to have ICT the focus, but to use it "to supplement lessons and give students a chance to see technology incorporated into learning." According to Joan, ICT "does not necessarily have to be the main source of a lesson, but I think it is a great hands-on way of teaching."

Like William and Sam, Joan stressed the idea that ICT needed to be implemented tactically in order to be beneficial. She expressed dissatisfaction with the passive use of ICT-based games she had experienced as an elementary student herself, as she did not see them as having any "educational value." In contrast, she was impressed with her undergraduate instructors who had purposefully harnessed ICT to "encourage discussion

and participation” among students. Following this example, Joan was eager to integrate ICT into her future teaching in ways that would be educational. Towards this end, she planned on incorporating video games purposefully such that they would complement history and music objectives.

Even John, who was arguably the participant most passionate about ICT, did not simply accept the presence of ICT as being beneficial. John, like the other participants, was mindful that ICT had to be integrated thoughtfully. Although he was pleased with the five networked computers located in his practicum classroom, his narrative reveals that he questioned the educational value of these computers. John was concerned that the software installed on these computers was not challenging enough for his students, and as a result decided to make use of other computers in the school. Furthermore, after learning he had access to a portable LCT projector, John not only wanted to use it, but wanted to think of “good uses for it.”

Perceived Capacity to use ICT

The participants not only described their perceptions of ICT in terms of its educational value, but also through narratives that reflected their perceived capacity to use it. In each case study, the participant’s understanding of his/her own personal capacity to integrate ICT was evident in his/her proclaimed feelings about, approach towards, and reaction to ICT-related experiences. As is apparent in the vignettes of Chapter 4, each participant had a unique view of their own capacity to integrate ICT during the field-based placement. The following sub-themes illustrate that although the degree to which participants felt they could integrate ICT varied among the four cases, their perceptions regarding capability had common underpinnings.

Building Competence through Familiarity

References to self-confidence and competency with respect to ICT are evident in the expressed perspectives of all four participants. Each of the participants articulated beliefs about their ability to integrate ICT through statements corresponding to their personal familiarity with ICT. Analysis revealed that a participant's perceived familiarity with ICT could influence their beliefs regarding their ability to integrate it. Based on the content of the narratives, it was evident that the participants were themselves cognizant of this causal link. Moreover, it was revealed that a participant's confidence level may influence his/her future intentions with respect to ICT integration.

John, for example, who described himself as having "felt quite capable" with ICT during his field-based placement, expressed a desire to "go full steam ahead with incorporating ICT" into his future teaching. He considered himself "comfortable with ICT" and understood his intentions for incorporating ICT into his placement as an "extension of that comfort." Furthermore, he perceived himself as "an early adopter of ICT," and accepted ICT as being "pervasive throughout" his life. He felt strongly that his extensive exposure to and familiarity with ICT was what helped him to "use it competently" in a classroom setting. Despite having taken an educational technology course as part of his preservice program, John explained that he "had intended on integrating ICT before the course." He felt that his earlier experiences had already prepared him for ICT integration; the educational technology course merely gave him "more ammunition so-to-speak."

Though somewhat less confident than John, Sam also perceived his ability to integrate ICT in terms of his familiarity with ICT. "I would not go as far as to say that I'm an expert," John asserted, "but I would say that I'm a very capable user of

technology.” He considered himself to be a “technie”, although “not an instant adopter of new technology.” In his personal life, new technologies were something he liked to “get on board” with as soon as it was feasible to do so. Overall, Sam felt that the preservice training had provided him with only “a little bit” of exposure to educational ICT. The exception being the educational technology course, which he felt helped strengthen his awareness of specific integration techniques. Consistent with his assertion that he “felt fairly capable” integrating ICT during his placement, Sam expressed a desire to incorporate it “where possible” in the future.

Although their narratives of William and Joan did not manifest the high levels of ICT competence of John and Sam, the relationship between competence and familiarity was nonetheless apparent. In each of these two cases, the participant’s perceived lack of experience with ICT resulted in the cultivation of uncertain perceptions regarding aptitude. William, who characterized his early experiences with ICT as having been “limited”, felt that the preservice coursework (including the educational technology course) had only resulted in a “slight increase” in his level of confidence. Going into his placement he suggested that he felt like he still needed “to spend more time to gain familiarity and proficiency.” He described using ICT in a classroom environment as something that was out of his “zone of knowledge or comfort.” This perception was persistent, and after the placement William expressed a personal desire for more ICT-related experiences. “For myself, I would definitely like to improve my knowledge of ICT and how to incorporate it into lessons,” he asserted. “I guess I basically need to spend some time working with it.”

Referring to the integration of ICT, Joan expressed a desire “to be proficient with

it, despite my lack of confidence in it.” Prior to starting her placement, she perceived her ability to integrate ICT in a classroom to be “amateur at best.” Furthermore, she expressed apprehension over the possibility of trying to integrate ICT into her field-based placement, “without having had formal training with technology.” Even though Joan realized during her placement that she “was more confident” and “more capable” with ICT than she had originally thought, her self-doubt remained persistent. Despite her apparent achievements with respect to integrating ICT during her placement, she perceived it as simply “being able to get by.” Furthermore, she reported feeling “really uncertain” with respect to her ability to integrate ICT. Consequently, like William, Joan expressed a desire for better familiarity with educational ICT.

John and Sam, who perceived themselves as being highly competent with ICT, conceived their notions of familiarity in relation to others. As John’s narrative demonstrates, his palpable self-confidence was as much a result of his knowledge of ICT as it was his conviction that compared to others he was “rather lucky” because of his early exposure to ICT. When asked about his perceived ability to use ICT in a classroom, he responded, “I feel pretty competent with respect to this. I think there is a wide array of tools available that many people might not think to use.” Even prior to the placement, John perceived himself to be more capable with ICT than others. His self-confidence was further bolstered during the placement by his impression that other teachers viewed him as an expert. John’s perception that his “use of ICT was heavier than that of most [teachers in the school]” reflected his ‘can-do’ attitude toward ICT integration. Similarly, Sam’s perception that his ability to integrate ICT was “above average” was a reflection of his confident attitude. Sam not only felt that he was familiar with various ways of

incorporating ICT, but felt that he was more familiar than his peers.

Perceived Disposition for ICT Integration

Each of the four vignettes revealed that the participants perceived their capacity to integrate ICT as a product, a self-taught or innate skill-set. All of the participants credited their personal dispositions as being a critical factor in the development of their ICT-related competencies. Sam, for example, suggested that his ICT-related skills had been “mostly self-taught.” Although he perceived his past educational experiences with ICT to be limited in scope, Sam was confident he could acquire any skills necessary by “just sitting down in front of the technology and figuring it out.” His confidence was reinforced by his belief that he had an “intuitive notion of how things should work,” and his attitude “that I can try something and it doesn’t matter if I make a mistake.”

In a similar vein, William perceived his ICT-related skills as being something that had been primarily self-taught: “Everything has been trial and error,” he asserted, “That is how I have learned to use computers and other forms of ICT.” Joan explained that she too “learned how to use technology in classrooms from trial-and-error, and watching what others do.” Like William, Joan expressed the importance of learning on her own: “everything that I know about ICT seems to come from trial and error ... literally pushing buttons ... and all of that. So I think I was self taught. No specialized training.” John attributed his belief that he was “quite proficient with ICT” to a combination of factors, foremost being his perceived natural aptitude for ICT use: “That stems from my natural ability and a lot of encouragement from teachers in my high school and my own employment.” Technical issues or malfunctions associated with ICT integration did not intimidate John. Like Sam, he felt confident in his ability to troubleshoot.

Facing External Constraints and Barriers to Integration

Cross-case analysis of the four vignettes reveals that the participants shared similar experiences and beliefs concerning barriers to ICT integration. For the most part, the participants perceived their ability to integrate ICT as being inhibited to some degree by external factors. All of the participants filtered their perceived ability to integrate ICT through an awareness of time or resource availability.

Concerns involving time emerged as a particularly prevalent issue among the participants. Through his narrative, William expressed frustration over not finding the time to observe the computerized reading technology being used in his school. He had wanted to “see how students used and responded to it,” but things were too “busy” for such an opportunity. John expressed his challenge with planning time for the students to go into the school computer lab, as he “quickly learned that very infrequently does time pass as you think it will in the classroom.” Similarly, Joan suggested that the demands of a busy classroom made it difficult for her to find opportunities integrate ICT. At the beginning of her placement she reported lacking the time needed to gain a full appreciation for what ICT resources were available to her. Furthermore, at one point, she reported that her level of ICT integration was minimal because of being unable “to access the computer lab due to scheduling constraints.”

The notion that time constraints could negatively influence an individual’s approach toward the integration of ICT was perhaps most evident in Sam’s case. Sam attributed his perceived deficiency in ICT integration during his placement to “the time-constraints which limited access to the facilities that are available.” He reported that “there was little time available for accessing the computer lab.” Furthermore, he expressed frustration over his inability to assign an online research assignment because of

“time constraints.” His placement experiences led him to surmise that because they likely “just didn’t have the time to switch into it,” the other teachers at his placement school were failing to integrate ICT. “Given the time factor that teachers deal with,” he suggested, “I think that might be what’s stopping a lot of them.” In fact, Sam suggested that the time factor prompted him to stop trying to integrate ICT during his placement:

I can honestly say that I did not try. I thought about it, and I gave consideration to whether or not I could incorporate it. But given the time constraints of the day, and the necessity for flexibility, I decided not to go that route.

Although Sam was generally in favour of integrating ICT, as a result of barriers associated with time, his view adopted pessimistic undertones. This was evident in his suggestion that in some instances ICT could “end up taking up time and can take away from the benefit.” Sam suggested that he was going to try to incorporate ICT where possible, “keeping in mind that we have rather stringent deadlines within the school year, school week, and school day. Despite the fact that Sam perceived himself as relatively proficient with respect to integrating ICT, he recognized that “There is limited time to get things done.” Sam, like the other participants, realized that his capacity to integrate ICT was diminished as a result of time limitations.

Also manifest in the narratives were concerns that resource shortages could limit the capacity of the participants to integrate ICT into their classrooms. According to Sam, the field-based placement “opened my eyes to the fact that sometimes it [integrating ICT] is just not possible. For Sam, “the lack of ICT available” was a major obstacle to ICT integration during his placement, and was a source of frustration. He expressed the belief that had he had access to more technology, he could have improved some of his lessons. Nonetheless, his experience was also a source of insight: “You just have to be prepared

for what there is,” he stated, “While you would like to use ICT, if your school does not have the resources ... you can’t.” Similarly, Joan felt that the field-based experience provided her with a more realistic perspective of her capacity to integrate ICT in the future: “I feel that I am going to have to be a little more realistic in terms of cost and practicality,” she offered.

Although William and John did not explicitly express concerns over the availability of ICT resources during their placements, their narratives did hint at the significance of resource availability toward attitudes. William perceived resources to be plentiful at his school, and as a result felt motivated and even compelled to use them: “With the resources that were available there was no reason not to use them,” he exclaimed, “It would have been a crime not to use them.” Similarly, John was motivated by the simple presence of ICT resources, and sought not only to find them, but to make good use of them. He expressed confidence in his ability to source educational ICTs available in schools. Consequently, he was optimistic about his capacity to integrate such resources in the future.

Concluding Remarks

Through cross-case analysis, informed by an analysis of narratives, this chapter has uncovered the commonalities that exist across the four individual cases that comprised this study. The product of this analysis was a description of the themes that emerged from a rigorous review of data compiled during the preliminary within-case analyses. These findings were organized around two broad themes that represent the composition of the participants’ salient perceptions. The first of the major themes emerging from the analysis – *educational value of ICT* – revealed that the participants

understood ICT integration as a way of facilitating engaging instruction, making the curriculum relevant, and enabling student success. Furthermore, it was revealed by way of the first theme, while the participants perceived the integration of ICT as primarily advantageous, they did not see it as a universal remedy. The second theme – *capacity to use ICT* – revealed that the participants’ perceptions of ICT were influenced by their competence, their perceived disposition for learning to use ICT, and their experiences facing barriers and constraints.

In the final, concluding chapter, a synopsis of this study is provided. Then, building on the two major themes presented in the current chapter, interpretations and implications of the research findings are offered. More specifically, the findings are related to concerns facing initial teacher education programs. Tentative suggestions are offered as to how the findings can inform and benefit such programs. References to literature are integrated throughout the chapter in order to situate the findings within contemporary theories.

CHAPTER 6

Discussion and Implications

This chapter begins with a synopsis of the research and a general review of the major findings. It then sets out to address the last of the primary questions connected to the research objective: How can the findings of this research benefit initial teacher education programs? The intention here is not to produce case vignettes, as was done in Chapter 4, nor is it to build abstractions across cases, as was done in Chapter 5. The purpose of this concluding chapter is to present an interpretation of what can be learned from the within-case and cross-case findings. Such a discussion involves developing ideas about the findings and relating them to the literature and to broader concerns (Bogdan & Biklen, 2003). Accordingly, this chapter draws on appropriate literature to help interpret the meaning and significance of the findings and to relate them to concerns facing initial teacher education programs.

Since this research investigated relatively few cases, the interpretation of the findings, like the findings, must be taken as suggestive rather than conclusive. Generalizations, as stated previously, are limited by the bounds of the study. That being said, it is recognized that the reader is free to make their own generalizations and interpretations based on their own beliefs, experiences, and interpretations of the four case vignettes presented. This final chapter intends merely to serve a venue for the researcher's insights into the research. It places the findings into perspective and provides the reader with some possible conclusions and implications to contemplate.

Synopsis of the Research

The primary purpose of this research project was to investigate the perceptions of information and communications technology (ICT) held by four preservice teachers as they each engaged in their first field-based practicum. More specifically, the aim was to explore and reveal the interactions between the participants' educational beliefs about ICT and their field-based experiences with it. The thesis began with three central research questions:

1. How does each participant perceive the educational use of ICT during the field-based placement?
2. For each participant, what is the nature of the interaction between their beliefs about ICT and their experiences with ICT?
3. How can the findings of this research benefit initial teacher education programs?

Underpinning this research was a conceptual framework that identified *beliefs about ICT* and *experiences with ICT* as two interrelated and fundamental components of *perceptions of ICT*. Within this framework, which influenced the collection and analysis of the data, preservice teachers' perceptions of ICT were understood as having resulted from the interaction of their *beliefs about ICT* and their *experiences with ICT*.

Guided by this conceptualization, the research sought to reveal and investigate the perceptions of educational ICT held by four preservice teachers. Towards that aim, qualitative research techniques derived from narrative and collective case study methodology were employed. Questionnaires completed prior to the practicum, journal entries created during the practicum, and open-ended interviews conducted immediately after the practicum, served to elicit contextualized biographical and narrative data from the participants.

In view of Merriam's (1998) notion that a collective case study requires analysis

at two stages, the research employed both within-case and cross-case analysis. The within-case analysis took place first, with each participant being “treated as a comprehensive case in and of itself” (Merriam, 1998, p. 194). This stage of the research was a ‘narrative analysis’ that involved the organization of “data elements into a coherent developmental account” (Polkinghorne, 1995, p. 15). This entailed “a synthesizing of the data rather than a separation of it into its constituent parts” (Polkinghorne, 1995, p. 15). The outcome was the production of four individual case vignettes or stories.

Following the with-in case analysis, a cross-case analysis explored similarities and differences among the participants. This cross-case analysis resembled what Polkinghorne (1995) calls ‘analysis of narratives’ (p. 13). This was a paradigmatic analysis that located “common themes or conceptual manifestations among the stories” (Polkinghorne, 1995, p. 13). It provided a method to uncover the commonalities that exist across cases, and helped “generate general knowledge from a set of particular instances” (Polkinghorne, 1995, p. 14). The product of this stage of analysis was not a story, but a description of the themes that held across the four cases.

Discussion of Findings

The two key findings of this research are that preservice teachers conceive ICT integration in terms of: (1) its perceived educational value; and (2) their perceived personal capacity to use it. The four vignettes generated by the within-case analysis present a picture of how educational ICT is actually experienced by preservice teachers in the context of their field-based placements. These vignettes support the notion that preservice teachers’ field-based experiences with ICT “come in many colors and shades rather than the rosy and simplistic pictures educational technology policies tend to paint” (Shi, 2005). Told from the participants’ perspectives, these accounts demonstrate that the

past experiences, foundational perceptions, and the future intentions of preservice teachers are appreciably varied. Each case study illustrates that in order to understand a preservice teacher's experiences with ICT, it is important to have an appreciation for the larger context in which those individual experiences are situated. Consequently, the findings affirm the value of narrative inquiry as a fitting means for accessing, interpreting and understanding preservice teachers' perceptions of ICT. As is apparent in the case vignettes, stories capture "in special fashion the richness and the nuances of meaning in human affairs" (Carter, 1993, p. 6).

The four vignettes were all presented in one chapter because collectively they can provide greater insight and understanding to the reader than any single vignette (Polkinghorne, 1995). The collective case study design rendered it apparent that each preservice teacher has a unique story that shapes their approach to ICT integration. The findings show that the expressed approach and attitude of individual preservice teachers toward ICT is largely characterized by their perceptions of ICT. Such perceptions can in fact be conceptualized as a product of the ongoing interaction between their *beliefs about ICT* and their *experiences with it*. The multifaceted nature of the perceptions conveyed by the participants of this research concur with Sime and Priestly's (2005) finding that preservice teachers' existing beliefs and hypotheses about the uses of ICT are challenged on a regular basis as a result of various new experiences. Building on the finding of Sime and Priesly (2005), the current research identifies the field-based placement as a critical component in the "dynamic process" by which preservice teachers develop their attitudes toward ICT.

The above aside, each vignette in this thesis contextualizes an individual participant's beliefs within a framework of experience that extends beyond the field-based placement itself. Given the temporal nature of the stories, an appreciation for how

preservice teachers' practicum experiences interrelate with their past experiences and beliefs is gleaned. Each participant's antecedent ICT experiences are chronicled and the relationship between those experiences and the beliefs that emerged during the field-based placement are elucidated. Within each vignette, each participant's experiences and beliefs are contextualized within a discernible plot which follows their storied accounts of educational ICT-related perceptions leading up to and through the field-based placement. By causally linking a prior happenings to latter effects (Polkinghorne, 1995), the plot conveys significant experiences and beliefs. Thus, the participants' recollections and personal stories are expressed, significant relationships are revealed, and critical episodes are rendered comprehensible.

The themes resulting from the cross-case analysis are significant on two levels. Firstly, they are significant because they point to the realization that although the preservice teachers' stories and perceptions of ICT are diverse, they share important commonalities. Secondly, the findings of the cross-case analysis are significant because they offer insight into the configuration of preservice teachers' perceptions of ICT. Specifically, the findings show that preservice teachers conceive ICT integration in terms of its perceived educational value and their perceived capacity to use it. This is consistent with the notion that although a variety of factors are involved with technology integration, a critical component is the beliefs held by educators (Sugar et al., 2004). In a given context, a preservice teachers' *belief in the educational value of ICT* and their *belief in their personal capacity to use it* will determine their prevailing attitudes and approaches. So how can the results of this research benefit initial teacher education programs? In the three subsections that follow, it is suggested that the findings from this research can enlighten teacher education programs by informing theory, by informing practice, and by informing future research.

Implications for Theory

This research contends that the study of beliefs and attitudes can help to explicate preservice teachers' approach to ICT integration. The findings have corroborated previous research that suggest affects such as attitudes, values, and self-judgments can influence educator behaviour with respect to technology in the classroom (Milbrath & Kinzie, 2000). Accordingly, this research contributes to the increasing recognition that beliefs can significantly influence educators' motivation to integrate ICT. Furthermore, the findings can inform the development of theoretical frameworks for understanding preservice teachers' attitudes towards ICT integration. In particular, the current research findings may serve to bolster the utility of expectancy-value theory as a potential theoretical perspective.

Introduced in 1964 by Vroom, expectancy-value theory offers a theoretical perspective for "understanding and predicting behavior in the process of adopting innovations" (Wozney et al, 2006, 175). Underlying this theory is the notion that "individuals choose behaviors based on the outcomes they expect and the values they ascribe to those expected outcomes" (Borders, Earleywine, & Huey, 2004). Through this lens, intent is viewed as a direct precursor to particular behaviours. This theory suggests that if one can discern the elements that influence intention, then one can more accurately predict whether an individual will engage in a particular behaviour. The current research study is significant because it helps discern the elements that influence preservice teachers' attitudes, and thus intention, toward ICT integration. Through narrative, the four case studies bring to life the experiences, attitudes and intention of the participants.

According to the findings, preservice teacher's attitudes toward ICT relate to two main constructs: the perceived educational value of ICT, and their perceived capacity to

use ICT. It can be conjectured that preservice teachers' behaviour with ICT is a function of their beliefs about the educational value of ICT and their beliefs about their personal capacity to access that value. In other words, preservice teachers seem to be keen on integrating ICT when they value integration and expect that they personally have the capacity to execute integration. Initial teacher education programs need to be cognizant of these elements in order to address them.

Implications for Practice

Expectancy-value theory also proposes that by changing an individual's perceptions of potential outcomes, one can alter that individual's intent (Cruz, 2005). According to this viewpoint, and the findings of the current research, if initial teacher preparation programs were to encourage preservice teachers to believe in the value of ICT, and believe in their own capacity to integrate ICT, then new teachers may be more inclined to integrate ICT into their teaching.

In general, the participants in this research study indicated that they valued the integration of educational ICT. However, their belief in their personal capacity to integrate ICT fluctuated. Thus, it is suggested that initial teacher training programs, including the field-based placement components, may need to do more to help preservice teachers perceive their capacity to integrate ICT in a more positive light. This research found that participants' perceived competence with ICT integration tended to stem from their feelings of familiarity with ICT and a seeming predisposition for learning ICT-related skills. Through the participants' narratives, it was revealed that these perceptions of competence were largely established prior to the commencement of the teacher education program. This is consistent with Wang's (2002) suggestion that preservice teachers' perceptions are grounded in beliefs established early in their personal

educational experiences. Even though the participants perceived themselves to be relatively familiar and capable with ICT, it is possible that the preservice program could have done more to reinforce these beliefs.

Of particular concern is the finding that participants experienced common barriers to integration during their individual field-based placements. This same concern was addressed over a decade ago by Figg (1999), who in a related study also revealed issues of time and technology access as common constraints perceived by preservice teachers.

According to that study:

These findings would seem to suggest that preparing student teachers for the “real world” of technology use within the classroom could become an important part of training. Although being aware that these are problems that all teachers working with technology share may be sufficient to diminish fears of student teachers, training could offer “troubleshooting” components or suggestions for handling the day to day problems of time, space, supervision of students, lab access, and operation of the equipment (Figg, 1999, p. 50).

Initial teacher education programs need to ensure that preservice teachers are empowered with the skills they need to overcome barriers prior during their placement experiences.

Preservice teachers who are prepared in this way may be more optimistic about their capacity to integrate ICT. Although purposely placing students in ICT-rich classrooms for their practicum experiences is one option, it will not necessary expose preservice teachers to the “real world” of ICT use in the classroom. It is important for preservice programs to empower new teachers with a belief in their capacity to integrate ICT in a variety of “real life” classroom situations. Of course the first field-based placement is an important part of that process.

Perhaps one of the most interesting aspects of the findings was the lack of emphasis placed on the role of the mentor teachers with whom the participants worked. The cases considered reflected the findings of Moursund and Bielefeldt (1999) that most

preservice teachers “do not work under master teachers and supervisors who can advise them on IT use (p. 21). Like participants in other studies, the preservice teachers in this research “saw little if any modeling of computer use during field experiences” (Bosch & Cardinale, 1993, p. 26). However, despite the perceived lack of support from their mentors, the participants in this research remained generally enthusiastic about their ability to integrate ICT. Thus, contrary to the research findings of Doering et al (2003), the current findings suggests that mentor teachers may not play a critical role in preservice teachers’ perceived success with ICT integration.

Implications for Future Research

In corroborating previous research findings this study provides further support for future studies placing greater emphasis on educators’ beliefs and perceptions as means to explain ICT integration. Moreover, the current research highlights the significance of the field-based placement not only in the formation of preservice teachers’ beliefs regarding ICT, but also as an opportune time to reveal and explore those beliefs. Given the findings, future research that concentrates on the field-based placement component may wish to avoid focusing on any single factor that may influence ICT integration. Instead, research should take a more nuanced approach, and utilize designs that appreciate and embrace the dynamic nature of beliefs and attitudes.

One suggestion for future research in this area is to extrapolate on the two thematic constructs revealed by this study: *the perceived educational value of ICT* and *the perceived capacity to use ICT*. Perhaps quantitative instruments, based on expectancy-value theory (or other motivational frameworks for understanding ICT integration) could be informed by the findings of this exploratory research. This is to say that the qualitative findings of this study may be useful in the construction of a

quantitative survey or questionnaire. As was argued in the methodology chapter, the advantage of using qualitative methods in this study was that it generated rich, detailed data that left the participants' perspectives intact, while also providing a context for ICT integration. This initial research yielded valuable qualitative data regarding preservice teachers approach to ICT integration, providing insights into their beliefs and experiences, the language they use, and the issues and obstacles they identify. Such information could be used to inform the construction of a survey to collect quantitative data concerning ICT integration among field-based preservice teachers. Moving forward, quantitative researchers may want to test the findings and propositions generated by this study on larger populations.

Since the scope of this research study was limited, it is suggested that future investigations, informed by the findings of this research, follow participants from the initial training phases through to their first year of teaching and even beyond. Such studies could follow a qualitative or quantitative paradigm, but should be longitudinal in nature. Longitudinal studies have the potential to garner further insight into the Studler et al. (1999) hypothesis that the integration of ICT into field experiences may be the most critical aspect of preparing new teachers to use ICT in their classrooms.

Future research could also include a component of classroom observation in the data collection phase. Because the current research did not include classroom observations, conclusions were based solely on the participants' views of what occurred. While remaining focused on the participants' perspectives, research that augments data collection with classroom observations will be able to make stronger claims about prospective teachers' actual use of ICT.

Concluding Remarks

The narratives conveyed by this research stand testament to Ertmer's (1999) assertion that "Achieving technology integration is a multifaceted challenge that entails more than simply acquiring and distributing computers" (p. 53). In the four cases considered, although ICT needed to be present for the integration to occur, the mere presence of ICT alone did not drive integration. According to the findings, complex beliefs, rooted in experience, ultimately dictated how the participants approached the integration of ICT. This research, along with the supporting literature, represents an initial attempt to understand the nuances of that process.

Much can be learned from the four cases presented in this thesis. This concluding chapter has highlighted only some of the possible conclusions and implications that can be drawn from the participants' narratives. However, it is ultimately the responsibility of the reader to draw her or his own conclusions and implications. While these four stories all took place within one Canadian initial teacher education program, other stories are taking place in other programs around the country but go unheard. Policymakers, teacher educators and researchers should continue efforts towards understanding preservice teachers' experiences and beliefs with ICT.

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APPENDICES

Appendix A: Permission to Recruit

Dr. Juanita Ross Epp
Professor and Chair
Undergraduate Studies in Education
Lakehead University
955 Oliver Road
Thunder Bay, ON
P7B 5E1

Dr. Juanita Ross Epp,

My name is Stephen Hart, and I am a Masters of Education student at Lakehead University, supervised by Dr. Graham Passmore. I am currently seeking participants for a research study that will be conducted November and December of 2007. The study is tentatively titled “Stories of Practice: Preservice teachers’ Perceptions of Information and Communications Technology.” It is my intention to include in this study J/I level preservice teachers who will be conducting their first practicum placement starting November 12, 2007. Thus, I am seeking the permission and assistance of your office with respect to recruiting participants. Please note that this study has been approved by the Lakehead University Ethics Board.

Specifically I am asking if your office can send a recruitment poster via email on my behalf to all students in the one-year Bachelor of Education program informing them of my study. Permission is also being sought to place a printed recruitment poster on the main bulletin board of the Bora Laskin Building. I have attached the recruitment poster to this letter for your reference. This poster explains the nature and purpose of the study, and invites interested J/I preservice teachers to contact the researcher. All communication between potential participants and the researcher will be kept confidential.

This multi-participant case study aims to explore the interaction between participants’ (four pre-service teachers) beliefs about ICT and their field-based experiences with it. Perceptions of ICT that arise from this interaction will be elucidated by way of qualitative research techniques (narrative and case study methodology). Specifically, narrative inquiry will be used to explore four individual cases. The study aims to elicit perspectives about ICT that emerge in four preservice teachers as they participate in their first field-based practicum. It is anticipated that knowledge of how these perceptions form will hold value for initial teacher education programs.

Each participant will be expected to complete one short questionnaire, a weekly journal during their practicum (a total of five entries), and one interview session with the researcher. Potential participants will be made aware that involvement in this study is

completely voluntary, and is independent of the requirements of the Bachelor of Education program. To ensure that participants' involvement in the study does not interfere with their classroom responsibilities during their placement, questionnaires and weekly journal entries will be completed outside regular classroom hours. Furthermore, interviews will not be conducted until after the five week practicum is complete.

This research study poses no foreseeable risk or potential harm to any of the participants. I will analyze the questionnaire responses, journal entries and transcriptions of interviews to discover the patterns and themes discussed, but will use pseudonyms in the final report to ensure anonymity. Participants will be provided the opportunity to review all data and will be permitted to add, delete or change information to reflect what they want to say. It is anticipated that participants will in no way be inconvenienced or adversely affected by this study. Following the completion of the research, data will be securely stored at Lakehead University for the duration of seven years, as per Lakehead University regulations, and then destroyed appropriately.

The results of the study will be used for a thesis in partial completion of a Master of Education degree. Later, they may be published in scholarly journals or presented at academic conferences. Participants will remain anonymous in any publication or presentation of research findings. Following the completion of the study, a summary of the findings will be available at Lakehead University.

Please complete and sign the attached consent form if you agree to allow this study and the recruitment of participants to proceed. A response from you indicating your ability to assist me with recruitment would be greatly appreciated. Thank you for your time. If you have any questions about this research you are encouraged to contact me, Stephen Hart (807-683-7792, shart@lakeheadu.ca); my advisor, Dr. Graham Passmore (807-643-8702, gpassmore@lakeheadu.ca); or Lakehead University's Office of Research (807-343-8283, research@lakeheadu.ca).

Sincerely,

Stephen Hart
M.Ed. Student, Lakehead University
shart@lakeheadu.ca
(807) 683-7792

Recruitment Consent Form

I, _____, have read and understood the cover letter outlining Stephen Hart's study tentatively titled "Stories of Practice: Preservice teachers' Perceptions of Information and Communications Technology." I understand that:

(Please place checkmarks in boxes, sign, and date to signify your understanding)

1. Assistance has been sought from the Undergraduate Studies in Education office with respect to recruiting participants for this study. An email will be sent (via the Undergraduate Studies in Education office) to prospective students, and a recruitment poster will be placed on the main bulletin board in the Bora Laskin building.
2. Communication between the researcher and participants will be kept confidential.
3. Participants will remain anonymous in any publication or presentation of research findings.
4. Participation in this study is completely voluntary, and is independent of the requirements of the Bachelor of Education program. Prospective participants are made aware of this.
5. Participants may withdraw from the study at any time without penalty.
6. Interviews will be audio-recorded and transcribed for analysis.
7. Participants may ask that audio recording stop, or discontinue the interview at any time during the process if they so choose.
8. Participants may refuse to participate in any part of the study or decline to answer any questions.
9. Journal entries and questionnaire responses will be also be collected for the participants for analysis.
10. Questionnaire responses, journal entries and transcriptions of interviews will be analyzed to discover the patterns and themes discussed, but pseudonyms will be used in the final report to ensure anonymity.
11. Participants will have the opportunity to review all data and will be permitted to add, delete or change information to reflect what they want to say.
12. The thesis derived from this study will be used for partial completion of a Master's Degree in Education. Later, it may be published as an article in a scholarly journal or presented at a conference.
13. All data collected from this research study will be stored in a secure location at Lakehead University for duration of seven years, following which it will be destroyed.
14. Following the completion of the study, the research findings will be made available to me at my request.
15. The Undergraduate Studies in Education office will be provided with a copy of this consent form and the preceding cover letter.

Name of Administrative Official (please print)

Date

Signature

Appendix B: Recruitment Poster

Attention: Professional Year B.Ed. Students

My name is Stephen Hart, and I am a Masters of Education student at Lakehead University, supervised by Dr. Graham Passmore.

I am currently seeking participants for a research study that will be conducted November and December of 2007. The study is tentatively titled "Stories of Practice: Preservice teachers' Perceptions of Information and Communications Technology." I am seeking J/I level preservice teachers who will be conducting their first practicum placement starting November 12, 2007.

This multi-participant case study aims to explore the interaction between the participants' educational beliefs about information and communication technology (ICT) and their field-based experiences with ICT. While the field-based practicum will provide a focus for inquiry, other contextual influences that have shaped the participants' perceptions of ICT will also be considered. Each participant will be expected to complete one short questionnaire, a weekly journal during their practicum (a total of five entries), and one interview session with the researcher.

Participation in this study is completely voluntary, and is independent of the requirements of the Bachelor of Education program. Please note that this study has been approved by the Lakehead University Ethics Board.

If you are interested in participating in this study, or have any questions about the research, please contact me. All communication between potential participants and the researcher will be kept confidential. Thank you for your time.

Sincerely,

Stephen Hart
M.Ed. Student, Lakehead University
shart@lakeheadu.ca

Appendix C: Letter of Introduction (Cover Letter)

Dear prospective participant,

Stephen Hart, a Masters of Education student at Lakehead University, will be conducting research during November and December of 2007 for his study tentatively titled “Stories of Practice: Preservice teachers’ Perceptions of Information and Communications Technology.” The study has been approved by the Lakehead University Ethics Board. J/I level preservice teachers who will be conducting their first practicum placement starting November 12, 2007 are being sought to participate. This letter is intended to inform those interested in participating about the nature of the study. Please read the information contained in this letter carefully before proceeding to the attached consent form.

Purpose of Study

This study will explore the interaction between participants’ (four pre-service teachers) beliefs about ICT and their field-based experiences with it. Perceptions of ICT that arise from this interaction will be elucidated by way of qualitative research techniques (narrative and case study methodology). It is anticipated that knowledge of how these perceptions form will hold value for initial teacher education programs.

Procedures of Study

Initially you will be asked to complete a short preliminary questionnaire. The questionnaire, which is primarily biographical in nature, is designed to obtain individual teacher characteristics, and includes the following information: age, gender, education background, subject area, and computer ownership. You will also be asked to provide self-reports concerning your beliefs about ICT in the classroom, as well as provide a short narrative account highlighting your previous experience with ICT. It is estimated that this questionnaire will take approximately thirty minutes to complete, however you will be given seven days to return it to the researcher.

During your field-based placement you will also be asked to keep a journal pertaining to your experiences with ICT. In your journal, you will be asked to write a minimum of one page and maximum of five pages of reflections each week. You will have a total of five entries. You will be provided with guiding questions to assist you with your entries. To ensure that your involvement in the study does not interfere with their classroom responsibilities, you will be asked to complete the journal entries at home and outside regular classroom hours. It is estimated that each entry will take about thirty minutes.

Following the completion of your placement, you will be interviewed you about your experiences and beliefs pertaining to the educational use of ICT. This interview will last approximately one hour, and will take place at a location of your choosing. With your permission, the interview will be audio-recorded, however, you may shut the audio recorder off, or discontinue the interview at any time during the process if you so choose. Furthermore, you may choose not to answer any question the researcher asks of you.

Risks of the Study

This research study poses no known risks to participants. I will analyze the questionnaire responses, journal entries and transcriptions of interviews to discover the patterns and themes discussed, but will use pseudonyms in the final report to ensure anonymity. You will be provided the opportunity to review all data and will be permitted to add, delete or change information to reflect what you want to say. It is anticipated that you will not be inconvenienced or adversely affected by this study in any way.

Potential Benefits

It is anticipated that knowledge generated from this research will contribute to a theoretical understanding of how teachers construct educational beliefs concerning ICT. Such knowledge will hold value for initial teacher education programs that seek to prepare new teachers to incorporate ICT into their practice. The participants' narratives have the potential to contribute to the knowledge that informs meaningful field-based experiences and the educational use of ICT. In addition to filling gaps in the knowledge base, it is possible that findings from this study will serve as an impetus for future research. Furthermore, this research has the potential to benefit individual participants as it asks them to engage in critical self-reflection concerning their ICT-related beliefs and experiences. Such reflection may lead them toward personal insight and genuine learning.

Storage of Data

The integrity of the data collected from you will be a high priority throughout the study. All data collected from this research study will be stored in a locked cabinet at Lakehead University for the duration of seven years. Following that time it will be destroyed appropriately. All actions involving the thesis project will conform to the rules, regulations and procedural guidelines of the Faculty of Graduate Studies.

Withdrawal

You may withdraw at any time during the study without penalty or without loss of services or status at Lakehead University. If you withdraw, the data collected from you will be destroyed.

Dissemination of Results

The results of the study will be used for a thesis in partial completion of a Master's Degree in Education. Later, they may be published as an article in a scholarly journal or presented at a conference. Participants will remain anonymous in any publication or presentation of research findings. Following the completion of the study, upon request to Stephen Hart, the research findings will be made available to participants.

Contact Information

If you have any questions about your involvement or your rights as a participant in this study, you are encouraged to contact me, Stephen Hart (807-683-7792, shart@lakeheadu.ca); my advisor, Dr. Graham Passmore (807-643-8702, gpassmore@lakeheadu.ca); or Lakehead University's Office of Research (807-343-8283, research@lakeheadu.ca).

If you understand the content of this letter and wish to participate in the described study, please proceed to the attached consent form. Should you decide to participate in this study, you will be provided with a copy of this cover letter as well as a copy of the completed consent form.

Sincerely,

Stephen Hart
M.Ed. Student, Lakehead University
shart@lakeheadu.ca
(807) 683-7792

Participant Consent Form

I, _____, have read and understood the cover letter outlining Stephen Hart's study tentatively titled "Stories of Practice: Preservice teachers' Perceptions of Information and Communications Technology." I agree to participate in the study, and understand that:

(Please place checkmarks in boxes, sign, and date to signify your understanding)

1. Communication between the researcher and participant will be kept confidential.
2. I will remain anonymous in any publication or presentation of research findings.
3. Participation in this study is completely voluntary, and is independent of the requirements of the Bachelor of Education program.
4. I may withdraw from the study at any time without penalty.
5. The interview will be audio-recorded and transcribed for analysis.
6. I may ask that audio recording stop, or discontinue the interview at any time during the process if I so choose.
7. I may refuse to participate in any part of the study or decline to answer any questions.
8. Journal entries and questionnaire responses will be collected for analysis.
9. Questionnaire responses, journal entries and transcriptions of interviews will be analyzed to discover the patterns and themes discussed, but pseudonyms will be used in the final report to ensure anonymity.
10. As a participant, I will have the opportunity to review all data and will be permitted to add, delete or change information to reflect what I want to say.
11. The results of the study will be used for a thesis in partial completion of a Master's Degree in Education. Later, it may be published as an article in a scholarly journal or presented at a conference.
12. All data collected from this research study will be stored in a secure location at Lakehead University for duration of seven years, following which it will be destroyed appropriately.
13. Following the completion of the study, the research findings will be made available to me at my request.
14. A copy of this consent form and the preceding cover letter will be provided to the participant.

Name of Participant (please print)

Signature of Participant

Date

Appendix D: Preliminary Questionnaire

Name of Participant: _____

Date: _____

For the following questions, please circle the appropriate answer, or fill in your answer in the space provided:

Study Eligibly and Placement Information:

- (1) Are you currently enrolled in the one-year Bachelor of Education (Junior/Intermediate) program at Lakehead University?

Y N

- (2) Where are you conducting your first field-based practicum?

- (3) What is the grade level of your first field-based practicum?

Personal Characteristics

- (1) Age: _____

- (2) Gender: _____

- (3) Please list any educational training (including diplomas and degrees) you have obtained. Please list the year you completed your studies and the subject of concentration where appropriate:

(4) Have you had any specific computer or information technology training?

(5) What is your teachable subject?

(6) Do you own your own computer? If so, what do you use it for? And how often?

(7) Do you own or use any other devices you would classify as Information and Communications Technologies?

(8) In your own words, how would you best describe your perceived ability to use ICT in a classroom or educational context?

(9) Do you think ICT should be used in K-12 classrooms? Why? Why not?

(10) Do you plan on incorporating ICT into your lessons during the practicum placement? If so, how do you think you might use it?

(11) Are you apprehensive or nervous about the possibility of trying to integrate ICT during your field-based placement? Please explain your answer.

Past Experience

Please provide a short narrative account (2 pages), highlighting your previous experience with or exposure to ICT.

To guide this account, please consider the following prompt:

What past experiences have influenced how you currently perceive the use of ICT in schools?

You may want to think about:

- (a) Your experiences with ICT as a K-12 student.
- (b) Your experiences with ICT as an undergraduate student.
- (c) Your experiences with ICT during the teacher education program.
- (d) Your experiences with ICT in your personal life.

Appendix E: Example of Journal Entry Guide

Name of Participant: _____

Date: _____

Week / Journal Entry Number: (please circle)

1 2 3 4 5

Please write a minimum of one page and maximum of five pages reflecting on your experiences with ICT this week. You may record your journal in the paper booklet provided to you, or if you prefer you may use a word processor.

To guide you in your writing, please consider the questions:

- (1) Did you attempt to integrate ICT during your placement this week? How?
- (2) How did you see ICT being used during your placement this week? (How did students use ICT in the classroom?)
- (3) What are your thoughts, feelings, and perceptions toward the above experiences?

Appendix F: Interview Guide

This guide establishes some pre-determined questions that are considered essential to each interview, and serves as a checklist to ensure a benchmark of information is obtained from each participant. The interviews will be characterized as flexible, and will remain conversational. Consistent with narrative inquiry, participants will be encouraged to tell stories in response to the questions.

Questions focused on Beliefs

1. From your perspective, should ICT be used in K-12 classrooms? Why do you feel this way?
2. From your perspective, in what ways has ICT changed education?
3. What do you believe is the best way to incorporate ICT into classrooms?
4. Once you are a certified teacher with your own class, do you intend to incorporate ICT into your classroom activities?

Questions focused on Experiences

5. Do you recall educational ICT as being a part of your experiences as a K-12 student? Explain.
6. Tell me about your skills with ICT, how you achieved these skills; or your perceived lack of skills with ICT, and what has prevented you from acquiring these skills.
7. Did you try to incorporate ICT into lessons during your field-based placement?
8. Did you receive any support from your mentor teacher with regards to incorporating ICT into the classroom?
9. Can you think of any experiences during your preservice coursework that influenced how you approached ICT during your field-based placement?

Interaction between Beliefs and Experiences

10. Was there a time during your field-based placement when you got really motivated or excited about using ICT?
11. Was there a time during your placement when you got really frustrated with using ICT?
12. Tell me about your perceptions regarding how capable you felt using ICT during your field-based placement?
13. Do you think the field-based placement has influenced your outlook on the educational use of ICT? In what way?